



ANNUAL REPORT

20
22

Redefining mathematics
teaching and learning

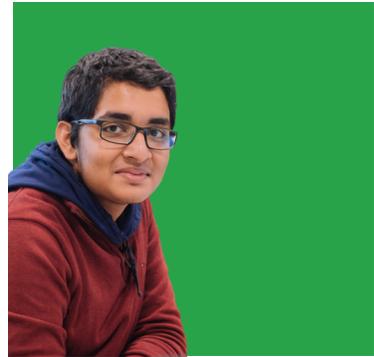
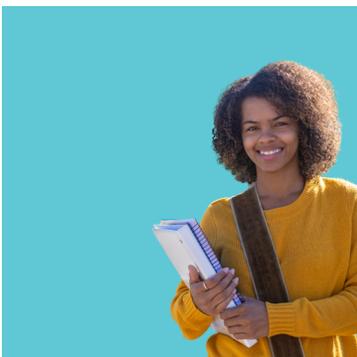


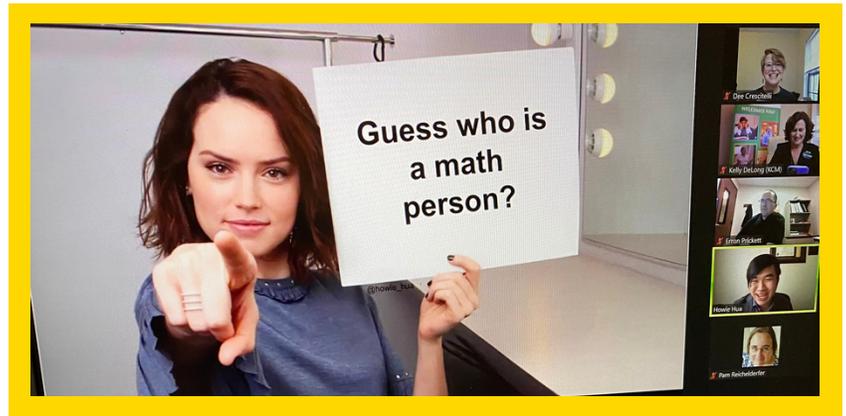
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This annual report contains highlights of the Kentucky Center for Mathematics' statewide work from July 1, 2021 to June 30, 2022.

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About the KCM



Mission

Our mission is to advance the knowledge and practice of effective mathematics teaching and learning. We provide and develop statewide leadership, facilitate professional learning experiences and cultivate innovation with the aim of improving mathematics education that is grounded in research, centered on practice and focused on learners.

Vision

We envision a world in which everyone is mathematically enlightened and empowered by working with educators throughout the state to evolve and sustain a schoolwide culture of engagement and sense-making.

Goals

- **Leading**- Inform, collaborate and cultivate leadership
- **Learning**- Prepare and develop educators
- **Launching**- Strengthen and advance math education

Coherence Model

Kentucky children can receive a coherent mathematics education experience where:

- Education experiences are characterized by a culture of sense-making and engagement
- Early grade teachers use their math content to develop skills for later grade math
- Teachers in later grades reinforce skills from early grades
- Students find out-of-class help both pertinent and impactful to their understanding of content

2021 - 22 Highlights

5,652

Kentucky Numeracy
Project Intervention
Guide Users

1,030

Professional
Learning
Attendees

343,394

KCM Website Views
from 50 states & 160 countries



73

Professional
Learning
Events

49,745

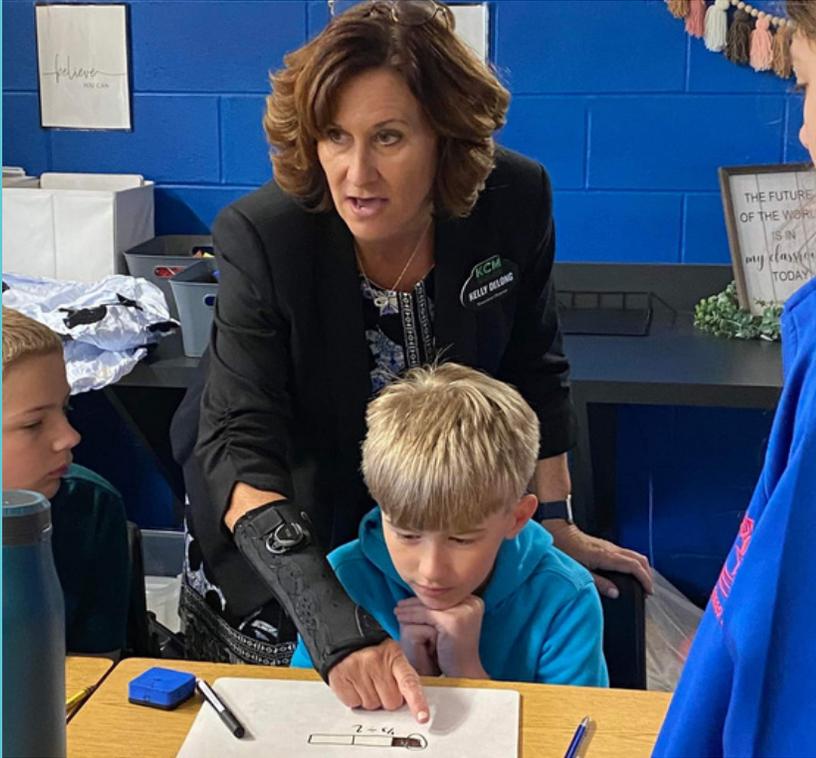
Intervention Guide Activities
Accessed



1,905

Fluency
Assessments
Performed

Letter from the Executive Director



"Nothing brings me more joy than to work with educators and students across Kentucky! It is my passion."

Teachers! Students! Vibrant mathematics classrooms! That is the world of your Kentucky Center for Mathematics. Nothing brings me more joy than to work with educators and students across Kentucky. It is my passion.

As always, your KCM was on the road and in schools doing work that is at the core of our legislated mandate. Your KCM Regional Consultants, Program Managers, Directors and Executive Director could be found conducting professional learning for teachers in:

- Reliable, research-based diagnostic assessment and intervention strategies
- Coaching models
- Mentoring models
- Developing teachers' mathematical knowledge
- Improving students' mathematical concepts, thinking, problem solving, and skills

Our whole focus is to assist students who are struggling or at risk of not mastering grade level mathematics. We help teachers to intervene at the point of difficulty and guide the teachers toward interventions that ensure student achievement.

This year we had tremendous success in collaboration with Kentucky school districts. I can't wait to see what amazing work the current school year holds for the Kentucky Center for Mathematics!

Kelly DeLong

Executive Director
Kentucky Center for Mathematics



Elementary



KCM Regional Consultant Lisa Riggs celebrated many victories in her support of Kentucky mathematics educators.

"I led a Math Recovery specialist (MRspl) cohort. I had the opportunity to work with many districts, like Perry County, and Lincoln County, to train teachers in AVMR. I also began the KCM Family Math course, which remains ongoing."



Foundations for Early Childhood (Pre-K)

Featuring content developed by the Erikson Institute, this course highlighted the "Big Ideas" in early mathematics which includes sets, number sense, counting, number operations, pattern, measurement and shape.

SEAL for Kindergarten

The Stages of Early Arithmetical Learning (SEAL) identified the different ways young children make sense of quantity, addition and subtraction. During this session, participants dug in deeply to the Kindergarten Standards and how the SEAL can support teachers in helping students meet those standards.

Comprehensive Course for Primary Grades

This learning opportunity was geared toward classroom, special education and mathematics intervention teachers of students in grades K-2. Participants acquired tools to assess, support and advance students' mathematical reasoning and knowledge. Topics included counting and cardinality, number and operations, early algebraic reasoning, conceptual place value, measurement and data, and math-literature connections.



Elementary

Mastering Manipulatives (K-2)

Manipulatives can be a powerful learning tool to help students discover and represent mathematical concepts. This course explored ways to increase conceptual understanding through the use of concrete and virtual manipulatives. This learning was supported with discussions on connecting representations and integrating research-based instructional strategies. Participants walked away with manipulatives for their classroom and ideas on how to use them effectively.



Elementary

Explorations in Number Talks & Routines

This course provided an opportunity for classroom teachers to learn strategies and acquire tools to advance students' mathematical reasoning. Topics included:

- **Grade 2-3:** addition, subtraction and place value; the use of instructional routines including number talks; and the use of instructional routines and number talks supported by manipulatives, visual models and number lines.
- **Grade 4-5:** addition, subtraction, multiplication, division and place value; the use of instructional routines including number talks; and the use of instructional routines and number talks supported by manipulatives, visual models and number lines.



Explorations in 3rd Grade Fractions

In this session, teachers explored hands-on activities designed to support students in developing conceptual understandings of fractions as numbers. Teachers deepened their understanding of fraction standards, seeing them as part of a progression.

Explorations in 4th & 5th Grade Fractions

Teachers explored instructional strategies such as the use of manipulatives, fraction models and rich tasks. Teachers deepened their understanding of the Kentucky Academic Standards for Mathematics, seeing them as part of a progression starting in first grade and continuing into middle school.

Explorations in Geometry (K-5)

Geometry is a critical area spanning all elementary grade levels with connections to measurement, operations and algebraic thinking, and fractions. In this course, participants strengthened their understanding of the Van Hiele Model of geometric reasoning and the Kentucky Academic Standards for Mathematics Geometry Standards.

Intervention



MRIS (Math Recovery Intervention Specialist)

In KCM's most rigorous learning experience, elementary teachers, who deliver intensive mathematics intervention to students at different ability levels, developed expertise in mathematics, through study, practice, collegial reflection, and application of tools and strategies for assessing and advancing student numeracy, based on the Learning Framework in Network.



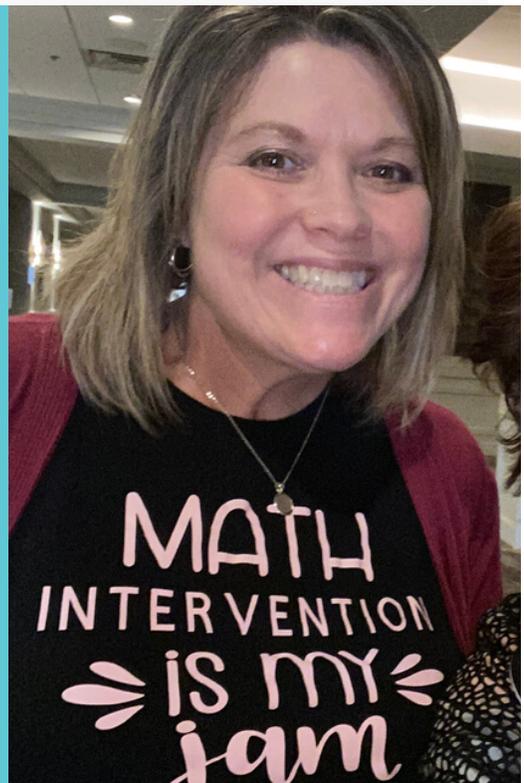
KNPI (Kentucky Numeracy Project Intensive)

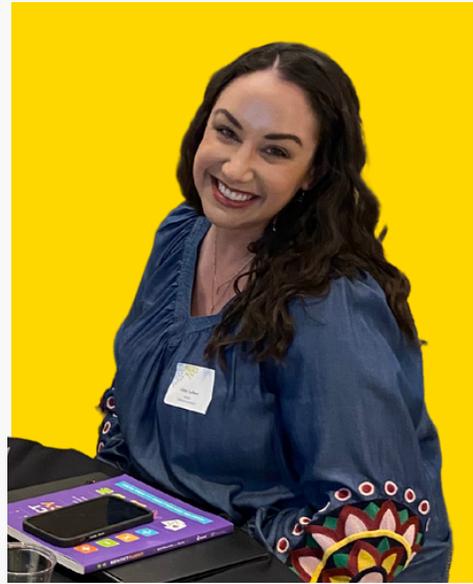
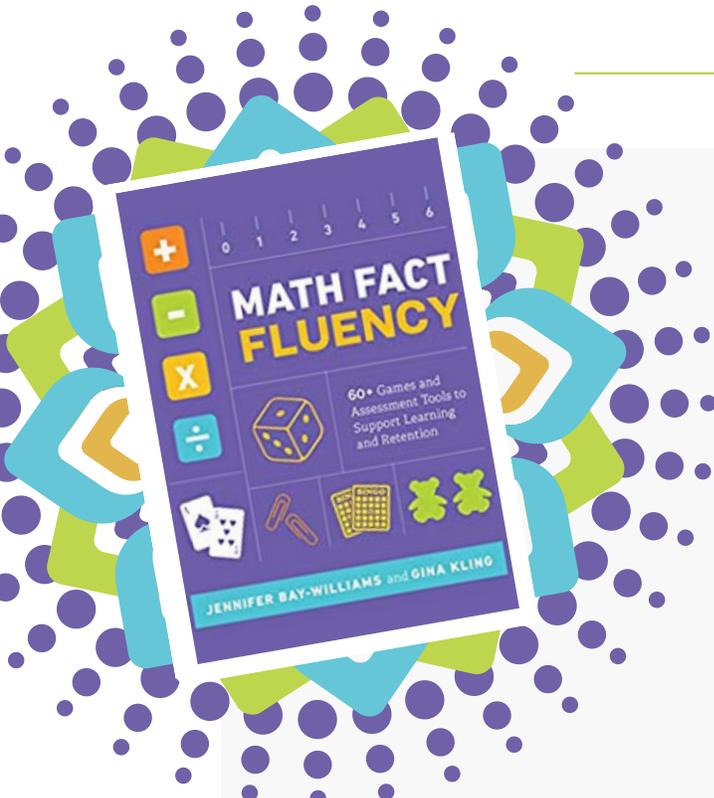
This ten-day course was built around Add+Vantage Math Recovery and was designed for elementary grade teachers to learn and practice assessments and teaching strategies for advancing students' foundational number knowledge, including addition, subtraction, multiplication and division.



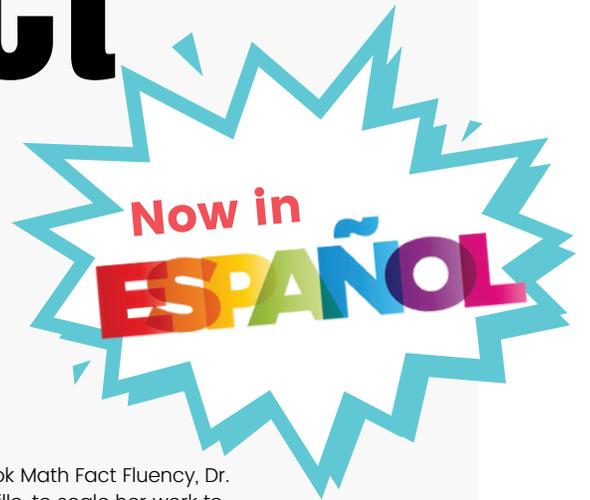
AVMR (Add+Vantage Math Recovery®) - Data & Instruction (AVMR/KNPI Graduates)

This session focused on using AVMR data to design lessons that are appropriate, purposeful and targeted for maximum student growth. Teachers who completed AVMR or KNPI participated in this course.





Math Fact Fluency



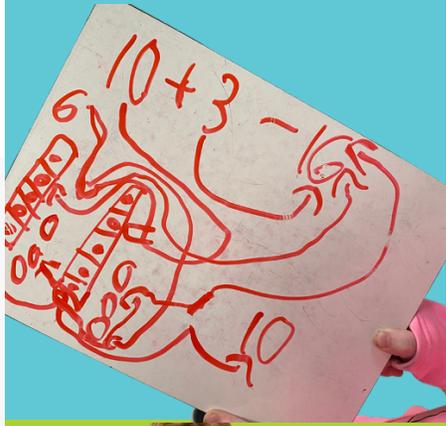
In 2020, KCM began working closely with author of the book Math Fact Fluency, Dr. Jennifer Bay-Williams, Professor at the University of Louisville, to scale her work to mathematics educators across the state of Kentucky. On KCM's Math Fact Fluency website, you will find 40% of the basic fact games and assessment tools found in the Math Fact Fluency book in easy-to-use, printable formats.

Since its inaugural year, the site has seen astounding traffic, providing assistance to mathematics educators from all 50 states and across the globe. Below are statistics for the Math Fact Fluency site in 2021-22.

The Math Fact Fluency site saw more than:

29,000
Total Users

169,000
Page Views



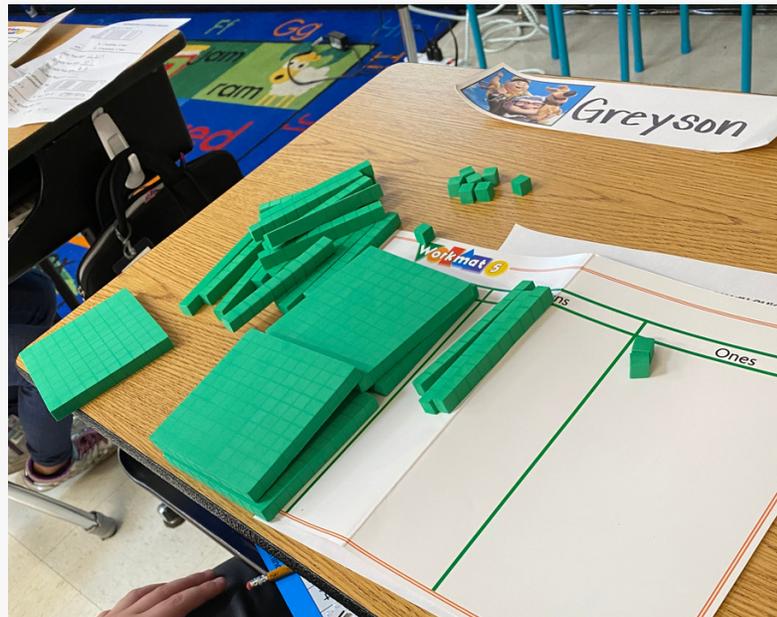
District Support

KCM leadership can be found in the field, working with teachers and school administrators to pinpoint specific needs and provide tailored support.

Perry County Schools

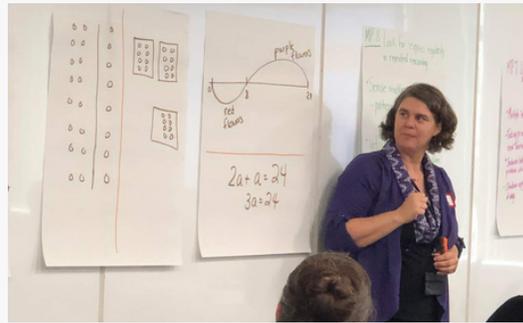
"I can only say positive comments about the professional learning that has occurred in the Perry County School District. Our teachers in grades K-5 have received AVMR level one training and six of our Instructional Coaches, along with myself, are in the process of Level II training. KCM has truly made a difference in our instruction and assessing of our students. We now can pinpoint each student's needs based on the assessments."

-Missy Moore, Instructional Supervisor



"Working again with teachers in person has been such a joy. There's a special kind of magic when teachers have opportunities to collaborate with peers from other schools and districts, and when they are able to use the manipulatives and explore lessons and activities before bringing those things back to their classrooms."

-Dr. Cindy Aossey, KCM Regional Consultant



Muhlenberg County Schools

"The work that is taking place through KCM and many districts across the commonwealth will help our learners build resiliency, improve their problem-solving skills and build self-confidence along their learning journeys. The professional development we take part in with our teachers and administrators is customized for their individual needs, which is amazing. I can't say enough great things about this work and our district is proud to partner with KCM."

-Matt Perkins, Assistant Superintendent

“Receiving the manipulatives and materials means I can go back and implement immediately!”



Mathematics Achievement Fund



Nothing has warmed my heart more than being back face-to-face with students and educators! Empowering educators with the tools, training, and support to bring their dream mathematics classrooms to life has been exciting!

-Julie Adams, Regional Consultant



The KCM supports the work of the Kentucky Department of Education through focused professional learning opportunities, teacher coaching and resource sharing.

KCM supported the MAF schools in the following ways:

- Professional development courses which focused on diagnostic assessment and intervention programs
- Coaching teachers in research-based mathematics instruction
- Effective ways to communicate with parents regarding mathematics via Kentucky Family Math Night events

Middle School



ROUTINES FOR REASONING

This course provided an opportunity for teachers of students in grades five through eight to learn strategies and acquire tools to advance students' mathematical reasoning. The course used instructional routines to give participants specific and repeatable designs for learning that support both the teacher and students in the classroom.

BUILDING NUMERACY

We know that students develop their mathematical reasoning skills over time and at different rates. The past year has created instructional gaps due to the time available for math instruction in different pandemic teaching situations. This year-long, in-depth course provided teachers with information and materials to enable them to strengthen mathematics instruction by building from students' current knowledge.

MODELING WITH MATHEMATICS

Modeling with mathematics is one of the most misunderstood Standards for Mathematical Practice, yet it is essential for ALL students to master. Participants in this four, half-day course received a book of routines for fostering mathematical reasoning and other materials to support them in engaging students in mathematical modeling.

STATISTICS AS A PROGRESSION

Statistics is gaining recognition as an important component of mathematics education, from the primary grades to middle and high school continuing to post-secondary. During this course, participants deepened their understanding of statistics and understood the standards and skills of their grade level as part of a progression starting in primary and continuing into middle and high school.

High School

Culturally Responsive Teaching and High School Mathematics

This course provided an opportunity for classroom teachers of students in grades 9–12 to learn strategies and acquire culturally responsive teaching tools to embed in their classrooms. Aligned to research-based teaching practices from Zaretta Hammond’s *Culturally Responsive Teaching and the Brain*, NCTM’s *Catalyzing Change for High School*, and KAS, participants explored tasks that included calculus, algebra, and geometry topics.

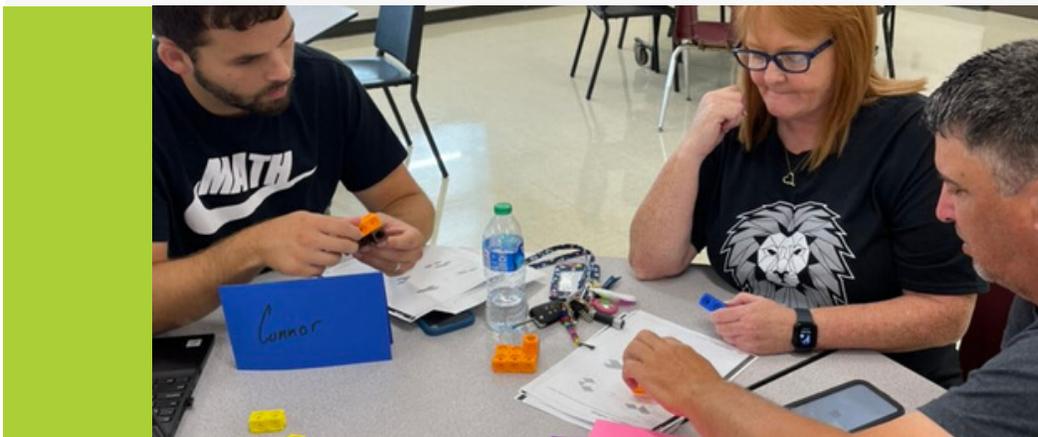


"This has truly been one of the best professional development experiences of my life. It was full of useful and practical information and activities that I can easily implement in my classroom."

This course provided an opportunity for classroom teachers of students in grades 9–12 to learn, understand, and apply the modeling process while embedding the Standards for Mathematical Practice.

Participants explored lesson tasks that included algebra and statistics topics as well as created high yield tasks to incorporate student mathematical practice for modeling.

High School Modeling



Post-Secondary



Mentoring with Dr. Sarah Kasten and Dr. Bethany Noblitt

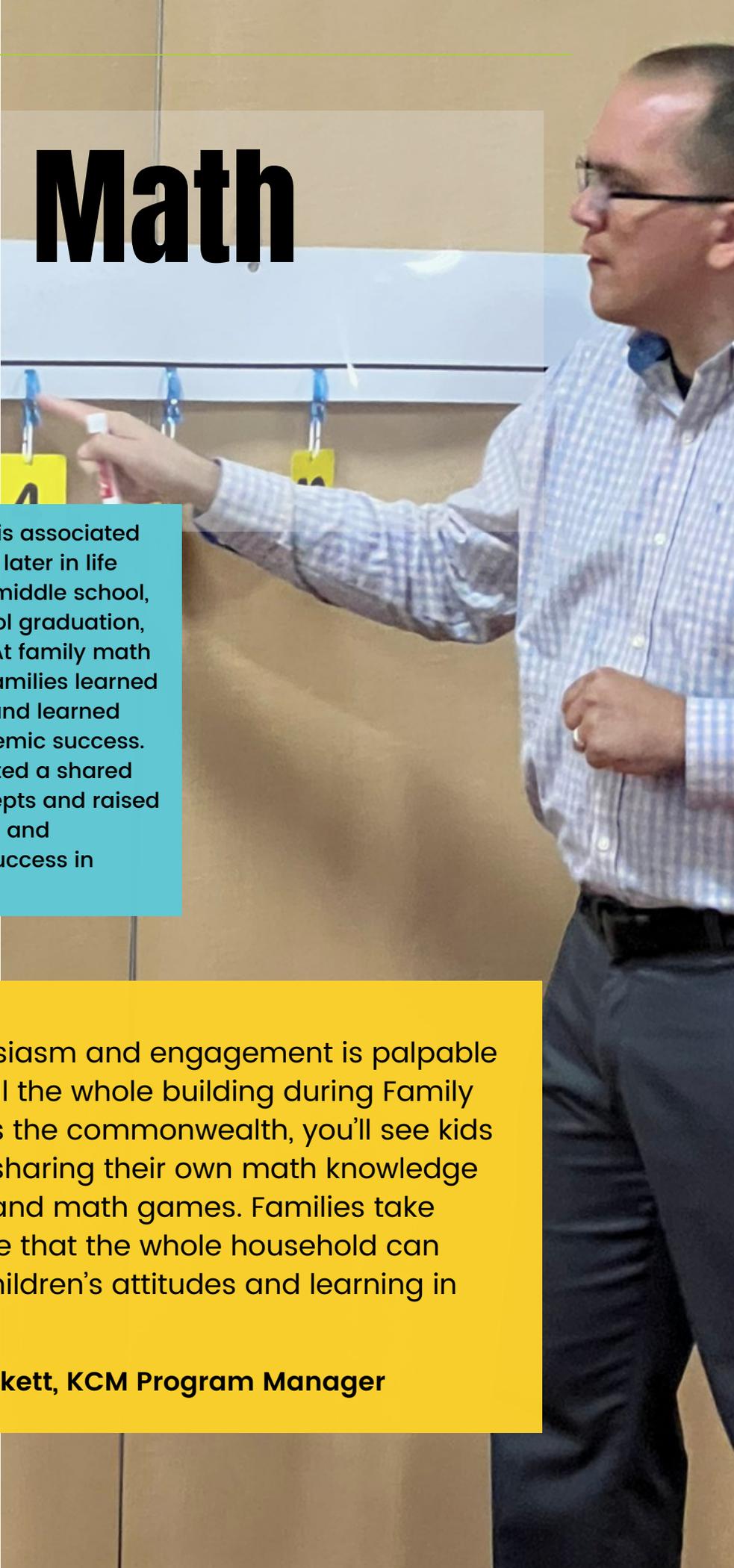
Drs. Sarah Kasten and Bethany Noblitt met with an engaged and motivated group of six mentor teachers across Kentucky who were each hosting and working with either a preservice middle or secondary clinical experience teacher candidate in their classroom. Via modules presented on Canvas, the mentor teachers studied and discussed the tenets of educative mentoring (Feiman-Nemser, 1998), learned about and chose an effective teaching practices as a focus, and enacted three co-planning and debriefing cycles with their preservice teachers. In addition to their individual work, the whole group met virtually for five study group sessions between January and May to support one another and discuss ways that each mentor teacher could grow in their mentoring practice toward being more educative.

"I was so excited to have the opportunity to participate in this mentoring program with my student teacher to help grow myself and my student teacher. I appreciated being able to talk with other mentor teachers and work with exemplary professors leading the cohort. The work that we accomplished together helped me and my student teacher that year and the student teachers I've mentored since. I feel more confident that I am able to effectively mentor pre-service teachers since being a part of this."

-Ashleigh Roe, Math Department Chair, Leestown Middle School



Family Math Night



Early mathematics achievement is associated with a number of success factors later in life such as getting better grades in middle school, increased likelihood of high school graduation, and better career opportunities. At family math nights, educators, children, and families learned and talked about mathematics, and learned how to support their child's academic success. Family math night activities created a shared understanding of the math concepts and raised expectations for math knowledge and achievement, which promoting success in schools.



"The level of enthusiasm and engagement is palpable – excited voices fill the whole building during Family Math Night! Across the commonwealth, you'll see kids taking the lead in sharing their own math knowledge through activities and math games. Families take home the message that the whole household can actively support children's attitudes and learning in mathematics."

-Erron Prickett, KCM Program Manager

Faculty Associate Spotlight

Dr. Kanita DuCloux

Dr. DuCloux, Chair of the Department of Mathematics at Western Kentucky University, shares her passion for equity in the mathematics classroom with educators in KY. As co-author of the book, Catalyzing Change in High School Mathematics: Initiating Critical Conversations, Dr. DuCloux challenges educators to advocate for an inclusive and equitable classroom for ALL students.



Dr. Jennifer Bay-Williams

2021-22 saw a milestone accomplishment for Dr. Bay-Williams as her six book series Figuring Out Fluency was released. It offers educators the inspiration to develop a deeper understanding of procedural fluency, along with a plethora of pragmatic tools for shifting classrooms toward a fluency approach.



Along with Dr. Kasten, Dr. Noblitt implemented a project with middle grades teachers as they mentored student teachers in their classrooms. "They explored and practiced educative mentoring with a great group of teachers who were dedicated to paying it forward to a group of future educators."

Dr. Bethany Noblitt



Dr. Kate Marin

"Joining KCM as a Faculty Associate and getting to know so many amazing math educators from around the state of Kentucky was a highlight of my year. Working with the KyMTL group has been energizing and inspiring!"



Dr. Sarah Kasten

"In the 2021-2022 academic year I had the opportunity to continue my research on educative mentoring with Dr. Bethany Noblitt. We were able to analyze recordings of wonderful mentor teachers working with novice mathematics teachers to create a vision of practice-based educative mentoring that we plan to share in a manuscript soon."



Dr. Jonathan Thomas

In 2022, Dr. Thomas worked with Dr. Beth MacDonald to co-author Teaching Mathematics Conceptually, which will be released in early 2023. This book describes guiding instructional principles for teaching and learning mathematics effectively and equitably, and grounds these principles in research and examples from practice.



Dr. Funda Gonulates

Dr. Gonulates worked hands-on with Kentucky Mathematics Teacher Leaders, coming together for monthly professional development sessions and a two-day summer retreat. Her leadership has been instrumental in growing our KyMTLs.



Grants

“As a special education teacher, learning about the Eight Effective Mathematical Teaching Practices afforded me the skills to make a profound pedagogical shift as an educator. Being able to experience the elevated engagement and achievement of my students was one of the highlights of my career to this point. The impact of being a course facilitator of the Eight Effective Math Teaching Practices course allowed me to empower and encourage other special educators.”

-Jane Goatley, Special Education Educator



Mathematics Teaching Practices Grant

In collaboration with the Kentucky Department of Education, University of Kentucky and Kentucky Valley Educational Cooperative

KCM partnered with the Kentucky Department of Education to develop high-impact online professional development courses focusing on the Eight Mathematics Teaching Practices. As a result of their participation in the online modules, teachers were able to bring research-based mathematics instruction to their classrooms as they integrate new instructional approaches and technology into their teaching practices. This capacity-building project focused on high quality professional development will have a long-term impact on teaching and learning in the districts of participating teachers.



”It is not everyday that we are able to build community and relish in the camaraderie of mathematics teaching with educators from all across Kentucky. It was incredible to share NCTM’s Eight Effective Mathematical Teaching Practices and, in return, hear of the pedagogical growth that each of the teachers were making in their classrooms every week.”

-Sumer Smith, Elementary Mathematics Teacher

Grants

High School Micro-Credentials Algebra-1

In conjunction with the Kentucky Department of Education, XQ Institute, and Student Achievement Partners

The goal of this statewide grant is to implement a high school math badging system to energize high school mathematics. A high school math badging system would offer an alternative credentialing mechanism, wherein students would be able to certify learning gained through a broad range of sources. The grant is highlighted in the United We Learn initiative by the Kentucky Department of Education as a vehicle for alternative assessment. This allows for a national collaboration with a focus on real assessment innovation in mathematics education.



"There has been tremendous value in the support KCM has provided KDE in this partnership including managing the logistics of the grant, securing meetings spaces, participating in Kentucky United We Learn Council exhibitions, designing professional learning for educators and district leaders, and ongoing collaboration to ensure standards alignment with Algebra I badges. The KCM team has been a strong and consistent partner for our team at KDE."

-Sarah Snipes, Program Manager, KDE Division of Innovative Learning





KyMTL

Kentucky Mathematics
Teacher Leaders

#SpiralUp

KyMTL, Kentucky Mathematics Teacher Leaders, was officially launched in July 2020, in response to the scaling initiatives brought forth in KCM's new strategic plan. The annual summer conference provides a time for these state-wide leaders to collaborate and envision mathematical excellence in their classroom, school, district and state.

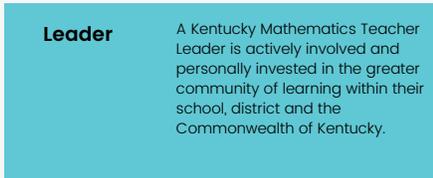
Mathematics

A Kentucky Mathematics Teacher Leader is a life-long learner who values and understands the importance of mathematics and is passionate about teaching and learning mathematics.



Teacher

A Kentucky Mathematics Teacher Leader has sound pedagogical knowledge and grounded understanding of students as learners.



Leader

A Kentucky Mathematics Teacher Leader is actively involved and personally invested in the greater community of learning within their school, district and the Commonwealth of Kentucky.



Online Resources

KCM added the Learning Mathematics through Representations (LMR) resources to our website and virtual versions of LMR fraction lessons. Additionally, mini-sessions were offered utilizing Desmos, Jamboard and number talks.



@KyCenterforMath



Kentucky Center for Mathematics



@KyCenterforMath



The Kentucky Center for Mathematics



The KCM has developed a robust platform of online resources and websites for continued support of participating educators. These online resources include assessments and research-based activities. All these and more are available in a database that can be search by standard, grade level, fluency benchmark, task group or setting.

KCM Online Resources Available:

- KY Family Math
- Resources for Virtual Instruction
- KCM Virtual Professional Development
- Kentucky Numeracy Project Intervention Guide
- KCM Fluency Assessments
- Math Fact Fluency
- KCM YouTube Channel

KCM Conference

The 2022 KCM conference – Innovate: Visualizing New Realities – was held virtually March 6–8, 2022. The virtual platform enabled a much wider audience, with educators from around the globe participating in sessions. The conference saw 499 live session attendees, with another 177 viewing recorded sessions.

KEYNOTES INCLUDED:

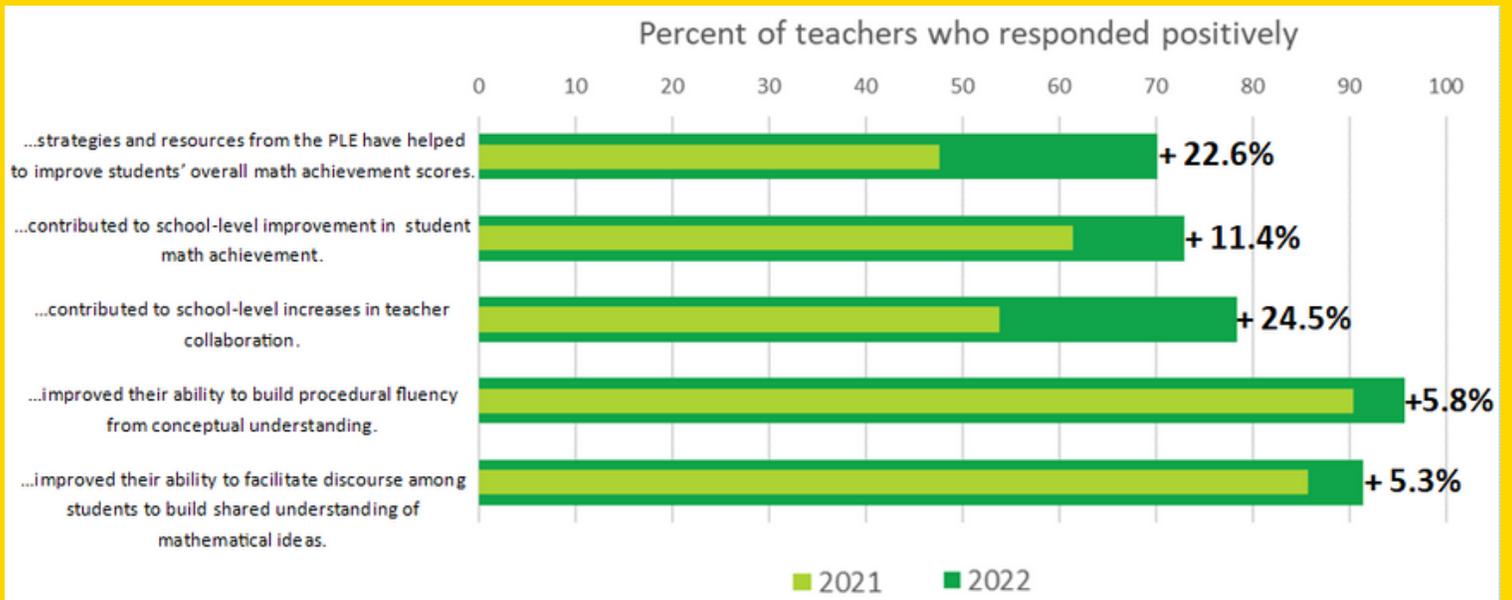
- Robert Berry, University of Virginia – "Equitable Teaching Practices Using the CARE Framework"
- Dr. Kanita DuCloux, Western Kentucky University – "Creating and Maintaining Equitable Structures in Mathematics"
- Howie Hua, California State University– Fresno – "Honoring Student Thinking"
- Carlos LópezLeiva, University of New Mexico – "Staggering Through Question and Practices in Teaching: Where's the Math, the Equity, and the Action?"



“The resources, text, materials, instruction, working with other teachers was an experience that I truly needed.”

Research

Teacher-Level Influence of PLE



Our KCM Courses Have a Positive Impact!

Teachers in my school are eager to learn and improve.



Increase from pre- to post-survey



Administrators in my school support my participation in this PLE.

Teachers in my school are open to integrating new evidence-based strategies and practices.

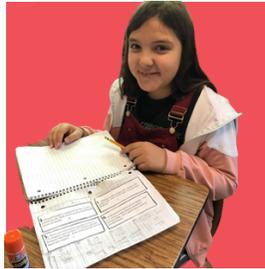


Increase from pre- to post-survey

Data independently analyzed by the Burkardt Consulting Center at Northern Kentucky University.

Budget

Source of Funds



| | |
|---------------------|--------------------|
| State General Funds | \$1,323,000 |
| Generated Revenue | \$382,655 |
| Total | \$1,705,655 |

Use of Funds



| | |
|---|--------------------|
| Teacher Professional Development- State | \$618,468 |
| Teacher Professional Development Services | \$79,940 |
| Teacher Resources | \$393,941 |
| Salaries/Wages | \$312,068 |
| Benefits | \$135,580 |
| Operating Expenses | \$32,632 |
| Total | \$1,572,632 |

Total Carryforward as of June 30, 2022

\$1,291,484



Contact

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