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KENTUCKY JOURNAL OF MATHEMATICS TEACHER EDUCATION

President's Message

On behalf of the Kentucky Association of Mathematics Teacher Educators (KAMTE), I hope you enjoy this issue of the *Kentucky Journal of Mathematics Teacher Education* (*KJMTE*). The article featured in this issue by Dr. Melissa Gunter features a task that gets pre-service teachers thinking deeply about measurement and fractions.

I would also like to take a moment to thank the founding editors of *KJMTE*, Drs. Bethany Noblitt and Nick Fortune, for their leadership in making this state-level journal a high-quality publication. If you or anyone you know is looking for a research outlet for a piece on mathematics teacher education with a rigorous, friendly, and quick review process, please consider submitting to *KJMTE*.

My immediate predecessors have both noted the need for community among mathematics educators in the commonwealth and that we are stronger as a group. I want to reiterate both those ideas and continue to offer KAMTE as an organization that can provide that community and strength. In an age where we have state-level performance funding models that attempt to pit our universities, colleges, and teacher preparation programs against each other, as well as federal-level actions that are decreasing the amount of research funding available for some of the most critical issues in mathematics education, finding ways to work together is as important as ever.

What's Inside…

To that end, I would like to put two events on your radar for next spring:

First, our Preservice Teacher Virtual Conference will be on Friday, March 27. The conference is geared toward college students in teacher preparation programs always free to attend over Zoom. We are currently working on finalizing speakers and events now and are excited to publish that information soon.

Second, are annual KAMTE retreat will occur in May. This is an opportunity for mathematics educators from across the state to come together and discuss and collaborate on current issues of importance.

I look forward to seeing you at one of both of these events. Please reach out with any questions and ideas for collaboration. I am available via email at Daniel.clark@wku.edu . For more information, please see the KAMTE website at https://kcm.nku.edu/KAMTE/ . To get updates on events and other issues, please consider becoming a member of KAMTE by clicking here.

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KAMTE Website: https://kcm.nku.edu/KAMTE/

KAMTE Membership Form: https://forms.office.com/r/C3jMa4bir4

A Message from the Editors

Dear KJMTE Readers,

Welcome to the latest issue of the *Kentucky Journal for Mathematics Teacher Education* (KJMTE). In this issue of the KJMTE, Dr. Melissa Gunter shares a task used with elementary and pre-service teachers related to measurement. According to the abstract, "The task requires students to think deeply about mathematics content relevant to teaching, utilize mathematical practices and process, as well as provides opportunities for high-quality learning as students envision the task in their future mathematics classrooms." We are grateful to Dr. Gunter for sharing this new task that I am sure will inspire the readers to try it out in their own classrooms.

As you read this issue of KJMTE, please consider us for submission of your own work. The KJMTE provides an open forum for both academic and informal discussions on various issues related to mathematics teacher education. Articles typically focus on the preparation of future mathematics teachers and the professional development of current mathematics teachers. The journal publishes work that appeals to mathematics teacher educators – this includes mathematics educators, mathematicians, teacher leaders, school district mathematics experts, and others. We aim serve the mathematics teacher education community, and we wish to encourage the development and sustenance of an equitable and welcoming environment for all individuals interested in mathematics education.

As you explore this and upcoming issues, we invite you to participate—send in your ideas, review the work of others, and be part of the conversation. Most of all, we hope you feel inspired to connect and collaborate with fellow Kentucky mathematics teacher educators. We think you'll find it rewarding.

Bethany Noblitt, Ph.D. and Nicholas Fortune, Ph.D.
Co-Editors, KJMTE

AMTE Announcements

The 2026 AMTE Annual Conference will be held in Portland, Oregon on February 5-7, 2026. The call for proposals will be available soon. Check AMTE.net for more details soon. The affiliate breakfast is a fun time for KAMTE members and supporters to meet and enjoy each other. Please plan on joining the KAMTE table if you attend the conference!

The AMTE Connections Newsletter for fall 2025 is available. The newsletter includes an article on how the visualization of mathematical objects through hand drawing can be achieved by drawing three types of images. It also has an article that addresses how mathematics teacher educators in Alabama engaged in a statewide collaboration to design grades K-5 educator preparation programs with a sequence of four integrated mathematics content and pedagogy courses. In the newsletter, you can also read about the latest issues of the AMTE-published Mathematics Teacher Educator and the CITE-Math journal.

Review for KJMTE

The journal's aim is to provide a space for the exchange of ideas to advance mathematics teacher educator practice. The journal welcomes manuscripts that support this aim.

Interested in reviewing for KJMTE? Find out more at KJMTE.org.

Questions about KJMTE? Contact the KJMTE Editorial Team at editors@kjmte.org.

KAMTE Board Members

Daniel Clark, President

Dr. Dan Clark is a mathematics educator in the Department of Mathematics at Western Kentucky University (WKU) where he works with preservice K-12 teachers as well as practicing secondary mathematics teachers and aspiring elementary mathematics specialists. He started working at WKU in 2016 after earning his Ph.D. in Mathematics Education from Michigan State University. His research interests include preservice teacher education, teaching and learning mathematics for social justice, and how teacher preparation programs structure mathematical experiences for preservice teachers.

Dee Crescitelli, Past-President & Treasurer

Dr. Dee Crescitelli is a Director at the Kentucky Center for Mathematics and teaches as adjunct at Georgetown College and the University of Louisville. She also serves as a Professional Learning Coach for Kentucky Adult Education. She is working to improve mathematics education from pre-K through college. Her teaching experience ranges from elementary through graduate school, adult education, and teacher preparation - threading real numeracy through all those levels.

Jamie-Marie Miller, Secretary

Jamie-Marie Miller is an Assistant Professor in the Department of Teaching, Learning, and Educational Leadership at the Eastern Kentucky University. She received her Ph.D. from the University of Kentucky in STEM Education. Dr. Miller teaches elementary and middle/secondary mathematics methods courses, geometry for elementary teachers to undergraduates along with graduate courses in elementary mathematics education and intervention strategies for struggling learners. Her research focuses on the progression of algebraic thinking in students, math-specific literacy strategies, assessment, and visible learning practices.

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Kate Marin, At-Large Representative

Kate Ariemma Marin is an Assistant Professor of Math Education at the University of Louisville. She has taught elementary and middle school and served as a math coordinator in schools across Massachusetts. Prior to the University of Louisville, she was a faculty member at Stonehill College. She teaches mathematics education courses and supports the development of pre-service and in-service teachers. Her research interest is in teachers' development of Mathematical Knowledge for Teaching and generational differences in teachers. She is committed to supporting teachers and promoting the knowledge that they bring to the profession.

Michele Cudd, At-Large Representative

Michele Cudd is an Assistant Professor in the Department of Early Childhood, Elementary and Special Education at Morehead State University, where she teaches future elementary, middle, and high school teachers. She is interested in supporting novice teachers to develop more student-centered discourse practices. In her free time, she often is hiking on trails with her dog.

KAMTE Membership

Membership to the Kentucky Association of Mathematics Teacher Educators (KAMTE) is always open for any faculty member that works with preparing pre-service and in-service teachers at any level. To join, contact Treasurer **Dee Crescitelli** at dee.crescitelli@louisville.edu.

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Upcoming Events

March 27, 2026	KAMTE Pre-Service Teacher Conference	Virtual
May 2025	*KAMTE Retreat	Grant County, KY
February 5-7, 2026	Annual AMTE Conference	Portland, OR

*Visit the KAMTE website for more information to be posted soon.

Call for Manuscripts

The editors of KJMTE are soliciting manuscripts for publication in the next issue of *the Kentucky Journal of Mathematics Teacher Education* that builds on the theme of the first issue: "The Next Generation of Mathematics Teachers."

Specifically, we ask authors to consider the following: What are the next generation of mathematics teachers? What are their needs? What role do mathematics teacher educators have in meeting those needs? How can mathematics teacher educators best prepare the next generation of mathematics teachers for their work?

The journal's aim is to provide a space for the exchange of ideas to advance mathematics teacher educator practice. The journal welcomes manuscripts that support this aim. Of particular interest are manuscripts that address an issue in mathematics teacher education and the methods/intervention/tools that were used to investigate the issue along with the means by which results were determined and the impacts on practice. Manuscripts should fall into one of the following categories:

Manuscripts that describe effective ways of influencing teachers' knowledge, practice, or beliefs. This might include a description of activities, tasks, or materials that are used by a teacher educator to influence teachers in some way. These manuscripts would include a rationale for the intervention, a careful description of the intervention, discussion of the impact of the intervention, and how it might be used by others.

Manuscripts that describe the use of broadly applicable tools and frameworks in mathematics teacher education. This might include a classroom observation protocol, a task analysis framework, assessment tasks, or a framework for a teacher education program. These manuscripts would include a careful description of the tool or framework, what it is designed to capture, its use, and a discussion of the outcomes. The manuscript should include an explanation of how to interpret the results of the data captured by the tool. The tool should be made available for other professionals to use, modify, enhance, and study.

If you are interested in writing a manuscript for an issue of KJMTE, please visit the KJMTE Current Call for Manuscripts for the Author Toolkit where you can find formatting guidelines and information for preparing and submitting a manuscript to KJMTE.

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Making Units Count: A Measurement Task for Pre-Service Teachers

Melissa Gunter
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Abstract

In this article, a mathematics educator shares a task used with elementary and secondary mathematics pre-service teachers related to measurement. The task requires students to think deeply about mathematics content relevant to teaching, utilize mathematical practices and process, as well as provides opportunities for high-quality learning as students envision the task in their future mathematics classrooms.

Keywords: mathematics education, teacher education, measurement

The Association of Mathematics Teacher Educators (AMTE) *Standards for Preparing Teachers of Mathematics* (2017) remind us that it is essential to allow our pre-service teachers (PSTs) to think deeply about mathematics content relevant to teaching, build mathematical practices and processes, and provide multiple opportunities for high-quality learning throughout our programs. In our day-to-day practice, implementing tasks that require mathematical reasoning and promote problem solving (National Council of Teachers of Mathematics [NCTM], 2014) help us build learning experiences that serve these goals. As a mathematics teacher educator, though, sometimes you just need a new task. You flip through your folders (and folders) of assignments, assessments, projects, and tasks for inspiration, and it all falls flat. Some of them have been used twenty times in the last three years, some do not engage students as much as you would like, and still others require technology from a time gone by (my transparencies haunt me from time to time, too). I would like to share a task that I have used with elementary and secondary pre-service mathematics teachers and perhaps it will be the inspiration you need.

Creating Units of Measurement

In this task, PSTs create their own distance unit from a length of rolled-out receipt paper (available from most office supply stores). I often begin with no preamble, asking PSTs to form small groups of two or three and then walking around the room to roll out the paper. The mystery grows as I prompt each group to “tell me when to stop” and then cut the paper as they indicate. Once each group has their own length of receipt paper, I tell them that their length of paper is their new unit for measuring distance.

PSTs are then prompted to use their new unit to measure some items around our classroom. I often have two or three items listed that I would like them to measure such as the width of a desktop or the height of the tray for the dry-erase markers. These items are somewhat arbitrary and depend upon the classroom and the furniture within it. As a class, we add three or four more items to the list, and then groups set off to take their measurements. A table is displayed on the board for them to share their data when they are finished. Before the PSTs begin measuring, I ensure that our list includes at least one large object and one small object. A relatively large object requires PSTs to think about how to measure end-to-end while only having one copy of their unit since I do not allow them to make more copies. Conversely, a relatively small object requires them to think about partitioning their unit, and it never takes long before someone says, “Do we round our measurements to the nearest whole unit?”

It is a good question, so I pose it back to the class. Generally, we agree that we could measure more precisely if there were fractional marks along the length of their units. “How can we make those marks?” I ask, because I have very conveniently left all the conventional rulers in another location today. In a few minutes, PSTs have puzzled through how to fold their unit in half, and in half again and again, until they can construct and mark halves, fourths, and eighths. Some groups who have long enough units even mark sixteenths and thirty-seconds.

As PSTs complete their measurements, they realize that they must name their units to display their data on the board so there is often a quick conversation among the group members to determine a name for their unit. Honestly, this is my favorite part of facilitating the activity because the conversations that result in the unit names and the names themselves are always interesting if not outright hilarious. Once the data table has been filled in (see Figure 1), I ask them to generate questions they have from looking at the data.

Unit Name	Desk (width)	Computer Monitor	Windowsill (width)	TV width
Smooth	$1\frac{1}{2}$	$1\frac{11}{16}$	$2\frac{1}{2}$	$4\frac{13}{16}$
Toe	$2\frac{7}{8}$	$3\frac{1}{2}$	$4\frac{3}{8}$	$11\frac{7}{8}$
Doug	$2\frac{9}{16}$	3	$4\frac{7}{16}$	$8\frac{5}{16}$

Figure 1. An example data table, filled in with PST measurements.

This question-generating exercise allows me to model a very helpful assessment strategy, in which learners work to generate good questions about the mathematical content they are learning (Keeley & Tobey, 2011) and also gives me information about how my PSTs mathematize situations in the process of their own learning. After recording their questions on the board (see Figure 2), student groups discuss which questions they find most interesting, what grade levels would be appropriate for those questions, the prior knowledge an elementary or secondary student might need in order to answer each question, and which mathematical strategies or procedures might be helpful in answering the question.

Which unit is biggest/smallest and how do you know?

How many Toes are in 1 Smooth? How many Toes in 1 Doug?

Which unit is closest to 1 foot? 1 inch? 1 centimeter?

How do our units relate to conventional units?

Order the units from least to greatest in size.

Write a conversion equation from Toes to Smooths.

Figure 2. Questions from a question generating session.

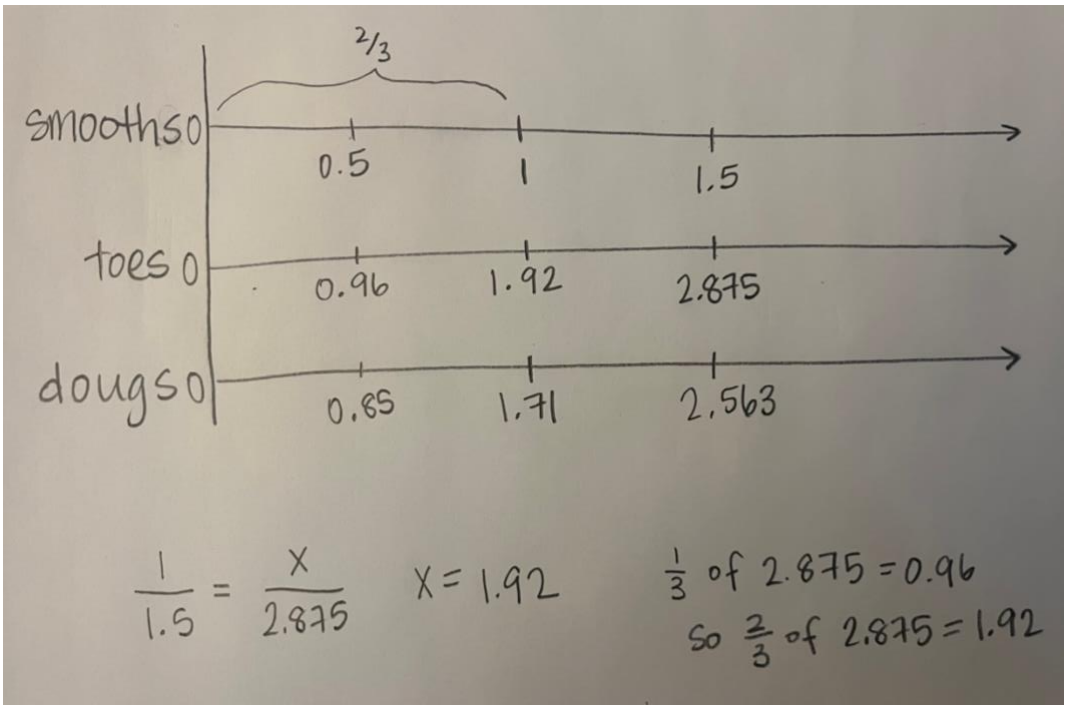
Student Solutions

Depending on the time remaining in our class session, we answer any number of their generated questions and modify our initial responses to the grade-level or prior knowledge required as necessary. As we progress through the deepening of our own understanding of rational numbers, ratios, and proportional relationships, we can refer back to these units that we created. We often use them on other occasions to explore other mathematical content, like the combination of fractions or using double- and triple-number lines to represent proportions.

The last time I facilitated this activity, PSTs were interested in answering questions that related the units to one another and to standard measurements as well as creating a double-number line to visualize their proportional relationship in order to convert between the units. Figure 3 shares a vignette of the classroom presentation (with pseudonyms) from Group 1, whose members worked on relating "Smooths," "Toes," and "Dougs."

Dr. Gunter asks Group 1 to share how they related the measurements by showing their work on the board and explaining it.

"Well, we knew that if we looked at one object, those measurements would be equivalent. So, we drew a triple-number line," Wendy explains. "We looked at the measurements for the desk width and put them in equal spots on the number lines."



Sung displays their work on the board using the document camera and points to the values 1.5, 2.875, and 2.563, before adding, "We converted to decimals, too. We were really trying not to jump straight to the proportion equation, Dr. G, so we looked at the number line for a while. Wendy noticed that if we looked at the Smooths number line, we could put 0.5 and 1 on there to show the top number line broken up into three equal pieces. So 1 Smooth would be two-thirds the amount of 2.875 Toes."

"What a great strategy! These are very unfriendly numbers so I'm glad you noticed that relationship," Dr. Gunter replies.

Wendy laughs, "We did the proportion equation anyway to help convince ourselves we were right. But there are 1.92 Toes in 1 Smooth."

"And how many Toes in 1 Doug?"

"We just did the proportion equation for that one. It's 1.12 Toes in 1 Doug," Sung answers. "Which makes sense because Dougs were the smallest unit."

Figure 3. Group 1 members share their work on "How many Toes are in 1 Smooth? How many Toes are in 1 Doug?"

As evidenced by our discussion, I had been encouraging PSTs to use more conceptual strategies for reasoning about ratios and proportions because they are often very comfortable using a proportion equation to find a missing value. However, they experience some disequilibrium when approaching these problems with the tools a late-elementary or early-middle grades student might have. In addition, they reasoned through their solutions by thinking about the relative size of the units which they had observed. Figure 4 shares the work of Group 2, which related the Smooths, Toes, and Dougs to centimeters and inches.

Dr. Gunter prompts Group 2 to share by asking, "Please tell us how you determined the relationship between our units and inches and centimeters."

Penny begins, "Because we don't have any centimeter or inch rulers, we decided to measure one of the square floor tiles in our classroom with each unit," while George writes the measurements on the board.

1 floor tile = $1\frac{7}{8}$ *Smooths =* $3\frac{7}{8}$ *Toes =* $3\frac{3}{8}$ *Dougs = 12 inches = 30.48 centimeters*

"Why did you measure a floor tile?" Dr. Gunter asks.

George responds, "We knew the tile was 12 inches by 12 inches. Well we assumed that, I guess. And we know how to convert inches to centimeters."

Penny continues: "We converted the fractions to decimals using our calculator and then divided to get unit rates for inches and centimeters."

Underneath the measurements on the board, George records:

1.875/12 = 0.16 Smooths per Inch
3.875/12 = 0.32 Toes per Inch
3.375/12 = 0.28 Dougs per Inch

1.875/30.48 = 0.06 Smooths per cm
3.875/30.48 = 0.13 Toes per cm
3.375/30.48 = 0.11 Dougs per cm

Figure 4. Group 2 members share their work on "How are Smooths, Toes, and Dougs relate to centimeters and inches?"

After the work had been shared to answer our most pressing questions, I asked the PSTs to consider which of the Common Core State Standards for Mathematics (CCSSM) and Standards of Mathematical Practice (SMP) this task might be related to for their future students (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

First, we considered the SMPs as a whole group, and I asked which practices they had used in their groups to complete the task. When a student volunteered an answer, they also supplied evidence for their response, which I recorded on the board. Once we all agreed our list of practices was complete, students again worked in groups to consider content standards. To facilitate PSTs making these grade-level connections, they looked at the CCSSM document collaboratively and discussed the mathematics used as they completed the task. As they were discussing, I walked among the groups and encouraged them to look at more than one grade-level, as they tended to focus on only one grade once they had found a content standard that fit the mathematics used in the task. In addition to drawing connections between the mathematical content and the practices used in the activity, PSTs also reasoned that this task could be adapted for younger grades as they begin to make sense of measurement units and concepts of fractions. Figure 5 shows a list of CCSSM and SMPs that came up in our discussion.

CCSSM	**SMPs**
6.RP.A.1, 2, 3 Understand the concepts of ratio and unit rate and reason with them to solve problems • *We used ratio and rate reasoning to solve this problem with appropriate language* *6.EE.B.7, 6.EE.C.9 Solve problems by writing and solving one-step equations; consider independent and dependent variables* • *We didn't do this explicitly in our work, but we could have if we had answered the question about writing a conversion equation. If this was a learning goal, we could make sure that that question was one being answered.* *7.RP.A.1, 2, 3 Compute unit rates; recognize proportionality and use this relationship to solve problems* • *We computed unit rates, recognized proportional relationship between our units of measure and used those relationships to answer our questions*	*Reason abstractly and quantitatively* • *We had to make sense of the relative size of the units along with relating the units to things we already knew, like the tile size* *Use appropriate tools strategically* • *We used our calculators and a triple-number line which would be grade-appropriate tools* *Attend to precision* • *We constructed fractional parts of our units to measure precisely and used appropriate rounding when converting fractions to decimals* *Look for and make use of structure* • *We used the structure of equal thirds on the number line to figure out how many Toes were in 1 Smooth*

Figure 5. CCSSM and SMP related to our measurement task.

Conclusion

The use of this task is helpful in a few ways that make it worthwhile in my own classroom for PSTs, and I believe can provide a generalized list of criteria for tasks that have methods-course potential. The first thing to consider is the depth and breadth of the related mathematical content. In the measurement task, the PSTs were prompted to reason about creating fractional pieces of a whole in a way that requires them to be precise. PSTs then began thinking about comparisons between the units as a multiplicative relationship and developing efficacy with secondary-level tools for reasoning about proportions. These are all concepts which are essential to teaching

about ratio and proportion (Olson et al., 2015), mathematical content that is foundational in the middle grades (AMTE, 2017).

Second, I want tasks in my methods courses to prompt PSTs to consider the connections between mathematical content at multiple grade levels and mathematical practices. Putting themselves in the role of learner creates meaningful conversations about what mathematical practices and content are developed as the task is completed. In addition to gaining familiarity with the content standards they will be teaching from, this facilitates a more thorough understanding of content progression for PSTs (AMTE, 2017) and reaffirms the notion that mathematical practices are to be developed at every level along with the content rather than separate from it (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

Finally, worthwhile tasks should allow me to model the effective use of a worthy task for these PSTs who will be required to identify, plan, and execute similar tasks for their own students in due course (NCTM, 2014; Smith et al., 2008). This modeling can prompt a variety of conversations, of course, and in this situation allowed us to have a great conversation about how this task might have been modified depending on the learning goals in our classroom. In any case, I hope you have found inspiration in this measurement task or, at the very least, feel motivated to convert your transparencies to a format more appropriate for the 21st century.

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Author Bio

Melissa Gunter, *Central Connecticut State University*, mgunter@ccsu.edu, Dr. Melissa Gunter is an Associate Professor of Mathematics Education at Central Connecticut State University and serves on the board of the Association of Mathematics Teacher Educators in Connecticut (AMTEC). Dr. Gunter's research is focused on considering how we center student voice and experience in mathematics classrooms at any level.