
# SIGMAA-QL Newsletter

**MAA Special Interest Group on Quantitative Literacy** Volume 11, March 2019

# A Note from the Editor

*by Mark Branson*

After a brief hiatus, I'm happy to announce this newest issue of the SIGMAA-QL newsletter. As Communications Officer for the SIGMAA, I'll be collecting articles, reviews, and event notices throughout the year to publish for the benefit of our membership. If you have anything that you'd like to have included in the newsletter, please reach out to me at the email address below. We're happy to share any items you have which may be of interest to the broader community - reports on courses or projects, curriculum materials, requests for papers, or conference announcements - or anything else you might have to share.

Thank you for reading and thank you for participating in the SIGMAA-QL!

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# Editorial: Has the Mission of SIGMAA QL Grown?

*by Victor Piercey*

In 2014, SIGMAA QL turned 10 years old. We held a panel and discussed all of the ways quantitative literacy has "grown up" as well as ways our community of practice has broadened. More recently, the MAA published a volume of MAA Notes edited by Luke Tunstall, Gizem Karaali, and I in which the chapter authors show that while the contexts for quantitative literacy have evolved, the core of what quantitative

## Contents of this volume:

literacy means and what it is has remained stable. This observation — the expansion of the audience and settings for quantitative literacy together with the stability of the core of the meaning of quantitative literacy — challenges the SIGMAA to consider whether our mission needs to similarly grow.

In addition, the perception of quantitative literacy remains problematic. Quantitative literacy is perceived by many in the mathematical community as a class that serves as an alternative to college algebra, not as a framework for habits of mind that applies just as much to students completing calculus — or even a mathematics major — to students who are satisfying a university requirement. Often, mathematicians think quantitative literacy is the class that is for those who "can't do serious math."

According to our charter, the mission of SIGMAA QL is:

*Quantitative literacy (QL) can be described as the ability to adequately use elementary mathematical tools to interpret and manipulate quantitative data and ideas that arise in individuals' private, civic, and work lives. Like reading and writing literacy, quantitative literacy is a habit of mind that is best formed by exposure in many contexts. While developing a quantitatively literate citizenry is the responsibility of a much larger community, it is the obligation of the collegiate level mathematics community to take leadership in (a) identifying the prerequisite mathematical skills for QL, (b) finding innovative ways of developing and implementing QL curricula, (c) assisting colleagues in other disciplines to infuse appropriate QL experiences into their courses, and (d) stimulating the national dialogue concerning QL. The purpose of this SIGMAA is to provide a structure within the mathematics community to achieve these goals.*

The question I raise is whether this needs updating in light of both a growth in the need for quantitative literacy, and more generally evidence-based reasoning, as well as the perception of quantitative literacy as a class for non-STEM majors.

As an example, consider the movement towards connecting mathematics to social justice. There is a growing community of mathematicians dedicated to incorporating social justice themes into the classroom at all levels. The journal PRIMUS will soon publish a special issue about mathematics and social justice. Gizem Karaali and Lilia Khadjavi are editing a volume of MAA Classroom Resources on Mathematics and Social Justice for which there were so many quality submissions, the volume is being split into two volumes. At the 2019 JMM, Dave Kung and Kira Hamman delivered a guest lecture for SIGMAA QL about quantitative literacy in the era of alternative facts that drew the largest crowd a SIGMAA QL event has drawn in at least 7 years.

In addition to using mathematics for social justice, there are also social justice issues for the field of mathematics. At the 2019 JMM, Pamela Harris and Edray Goins delivered two different invited plenaries related to the role of race and ethnicity in the mathematics profession. More recently, Edray was featured in a front-page New York Times article about his experience as an African American mathematician at a large research-oriented university.

For us in SIGMAA QL, this raises an important question: what is the relationship between social justice and quantitative literacy? Is social justice an example of a context for quantitative literacy, or is quantitative literacy one of many means to achieve social justice? How should this impact our mission as a SIGMAA? Perhaps our mission adequately includes social justice and equity. Perhaps those matters are independent and deserve their own SIGMAA. Perhaps the problem with the perception of quantitative literacy means our mission as written is more important than ever. But perhaps not. In light of these questions, I invite you to join us for a town hall meeting at MathFest 2019 in Cincinnati. Look for the event in the conference schedule and come and share your thoughts.

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# An Inspiring Talk on Quantitative Literacy in the Era of Alternative Facts

*by Mark Branson*

During the 2019 Joint Mathematics Meetings in Baltimore, the SIGMAA-QL invited Kira Hamman (Penn State University) and Dave Kung (St. Mary's College, Maryland) to speak on the necessity of Quantitative Literacy education in the current political climate. Kira and Dave delivered an excellent talk to a packed room, even during the coveted 6:00-6:45 Thursday evening time slot.

Figure 1: Kira Hamman and Dave Kung answering audience questions.

They described their talk as falling in the intersection of Quantitative Literacy/Reasoning and Social Justice, and spoke about their efforts to develop quantitative literacy resources focused on the mathematics needed by citizens (and non-cititzens, as an audience member pointed out) to participate in a representative democracy. By providing our students with the mathematics needed to understand the complex quantitative information present in our lives today, they posited, we could build a better and more equitable society.

Kira and Dave also raised the provocative question - "Who is left out at your institution?" Although we tend to focus on providing quantitative literacy tools to students in the liberal arts, we may be ignoring the needs of many other populations, including students from underrepresented populations, students with conservative views, and even STEM majors. While these students may be learning quantitative skills, they are not necessarily learning the specific quantitative tools they need to process quantitative information in a social justice context.

They also discussed the dichotomy between pedagogies based on authority and those based on autonomy. By encouraging intellectual autonomy in the classroom, we can model the kinds of behaviors we hope students will use outside the classroom. We can also provide them with better tools to detect "fake news" by de-emphasizing the role of authority in constructing knowledge.

Figure 2: A large crowd attended the session.

Kira and Dave's notes from the talk are posted on the SIGMAA QL website, if you're interested in learning more.

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# Update on Mathematics for Social Justice: Resources for the College Classroom

*by Gizem Karaali*

In the 2014 newsletter we had announced a book project on mathematics and social justice resources for the college classroom. The project gathered much interest from the community and as a result the original plan was revised and now there are two books in the making. What's even more exciting: the first volume is finally on its way! Edited by Gizem Karaali (Pomona College) and Lily S. Khadjavi (Loyola Marymount University Los Angeles), Mathematics for Social Justice: Resources for the College Classroom is expected to appear in 2019 from the American Mathematical Society's imprint, The MAA Press. The volume offers a collection of resources for mathematics faculty interested in incorporating questions of social justice into their classrooms. It begins with a series of essays from instructors experienced in integrating social justice themes into their pedagogy; these essays contain political and pedagogical motivations as well as nuts-and-bolts teaching advice. The heart of the book is a collection of fourteen classroom-tested modules featuring ready-to-use activities and investigations for the college mathematics classroom. The mathematical tools and techniques used are relevant to a wide variety of courses including college algebra, math for the liberal arts, calculus, differential equations, discrete mathematics, geometry, financial mathematics, and combinatorics. The social justice themes include human traf-

ficking, income inequality, policing, environmental racism and justice, gerrymandering, voting methods, and access to education.

The second volume, titled Mathematics for Social Justice: Focusing on Quantitative Reasoning and Statistics, is also in the works. Expect to see that one on the shelves in 2020!

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# Book Announcement

### *Shifting Contexts, Stable Core: Advancing Quantitative Literacy in Higher Education*

**Tunstall, Karaali, & Piercey (2019)**

One of the benefits of MAA membership is access to its diverse array of publications. A new book that SIGMAA QL members should check out is *Shifting Contexts, Stable Core: Advancing Quantitative Literacy in Higher Education*, edited by Luke Tunstall, Gizem Karaali, and Victor Piercey. As part of the MAA's Notes series, the volume includes chapters from a wide range of scholars involved in quantitative literacy in higher education—both veteran and new—and spans a number of topics centered around quantitative literacy such as assessment, curriculum, institutional matters, policy, and theory, among others. Luke, Gizem, and Victor began working with authors in 2016 on the volume, and are excited to see the publication finally in print. Be sure to check it out when you have time! Additionally, time permitting, consider contributing to publications like this in the future, or in related journals such as *Numeracy* or *Problems, Resources, and Issues in Mathematics Undergraduate Studies (PRIMUS)*.

## Bibliography

Tunstall, Luke, Karaali, Gizem, and Piercey, Victor (editors) (2019) Shifting Contexts, Stable Core: Advancing Quantitative Literacy in Higher Education MAA Press, Washington, DC

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# National Numeracy Network Meeting 2018

*by Luke Tunstall*

The 2018 meeting of the National Numeracy Network (NNN) took place October 12-14 at Michigan State University (MSU) in East Lansing, Michigan. With keynote talks from Gail Burrill (faculty at MSU and President of the International Association for Statistical Education) and Ellen Peters (faculty at Ohio State University and Director of its Decision Sciences Collaborative), as well as approximately thirty presentations from folks across the U.S., the conference fostered fruitful discussions centered around numeracy and quantitative literacy. Though not completely finalized, the 2019 NNN meeting will take place at Loyola Marymount University in Los Angeles, California. Members of SIGMAA-QL are encouraged to participate in the NNN, which is a network for folks from across the disciplines (e.g., economics, psychology, education) and to contribute to its peer-reviewed journal, Numeracy.

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# Reflections on the Contributed Paper Session on Innovative Pathways to Quantitative Literacy

*by Catherine Crockett*

At JMM 2019, SIGMAA-QL co-sponsored a contributed paper session entitled "Innovative Pathways to Quantitative Literacy" along with MAA's Committee on Articulation and Placement and subcommittee Curriculum Renewal Across the First Two Years (CRAFTY). The paper session featured six talks that described a variety of examples and ideas used to explore quantitative literacy in general education mathematics courses. Although the session was held on the last day of the conference and there were reports of a winter storm moving quickly into the area, the session was well attended. The audience was attentive and asked thoughtful questions of the speakers. It has been over a month since the conference and I still find myself reflecting on what I learned from the paper session. For me, there were three takeaways from this session. The first two are: the importance of engaging students through topics they care about and making QL more accessible.

## The importance of engaging students through topics they care about

Several of the speakers gave examples from interesting topics and discussed the impact on learning. For example, in Betty Love's talk entitled, "Introduction to Mathematical and Computational Thinking: A New Gen-Ed Math Course" she described how her new course is designed around visual patterns and the process of expressing these patterns into algebraic expressions/algorithms. In one example, the students created an algorithm describing an object, implemented the algorithm into Bricklayer code and then printed their object using a 3D printer. In Jennifer Anne BergnerâĂŹs talk entitled, "Building Quantitative Literacy through the Mathematics of Voting and Elections" she shared how exploring aspects of voting methods engaged her students and developed their quantitative literacy skills. She gave several examples and demonstrated a free polling app. In the talk entitled "Mathematics for a Sustainability: A General Education Mathematics Course", Russ deForest described a course he designed around the topic of sustainability. He shared several examples illustrating skills such as communicating quantitative information in relevant terms; estimation and precision; and models of exponential and logistic growth.

## Making QL more accessible.

My second takeaway is how different instructors and institutions are attempting to make quantitative teaching and learning more accessible. In his talk entitled, "Mathematical Modeling in the Liberal Arts Course", Craig M. Johnson explained how he made mathematical modeling more accessible by using the Wald method to do linear modeling of data. He argued that this method is simpler than linear regression while still giving students the experience of mathematical modeling. Vesna Kilibarda described the process her department is undertaking to improve education in their introductory courses in her talk entitled "Active Collaborative Learning and Faculty Development in Redesign of Introductory Mathematics Course". She described how they are redesigning their introductory courses by using peer to peer coaching to improve the accuracy of placement testing; a workshop to develop faculty teaching these introductory courses; and a common assessment approach for these courses. Finally, an interesting challenge was shared by McKenzie Lamb in his talk entitled, "An Inclusive Framework for Quantitative Reasoning". Lamb described how his intuition is attempting a new approach to QR. He has been tasked with designing a QR course that, in theory, could be taught by any faculty member on campus. In the talk, he presented the idea of organizing the course content around the concept of numerical comparisons and discussed the positive student feedback on this new course. My final takeaway from this papers session is

## The QL community is amazing.

As I sat through the paper session, I thought about how wonderful it is to belong to a community that is passionate about mathematics and care for the growth and development of our students. I am thankful for this community and what it has shared with me through the years. My hope is that we will continue to be passionate about mathematics, care for our students' development and strive to be an

even more amazing community. Hope to see you at the next paper session.

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# Recent and Upcoming Events

## MathFest 2019

**Cincinnati, Ohio, 7/31/2019-8/3/2019**

At the 2019 Joint Mathematics Meetings, Dave Kung and Kira Hamman called for a need to teach mathematics and quantitative literacy with an eye toward social justice. As part of their presentation, they not only reiterated the importance of promoting quantitative literacy for social justice (and vice versa), but they also pushed the audience to consider diverse and potentially divisive issues ranging from who "receives" quantitative literacy on their campus to how students are positioned in mathematics classrooms. Their remarks accentuate that the relationship between quantitative literacy and social justice is complex, and that there is much for the mathematics and quantitative literacy communities to consider as we teach in an era of alternative facts, dueling memes, and politically charged classrooms.

SIGMAA-QL would like to invite all members of the mathematics community who are interested in issues of social justice as well as pathways toward a quantitatively literate society to a town hall discussion at MathFest 2019 to follow up on some of these questions. In particular at this session we hope to start a much needed conversation about the roles people of mathematics can play in promoting quantitative literacy for social justice (and vice versa). Issues we would like to discuss range from teaching mathematics for social justice, to the role of QL in charting a path towards a more just society, to the future of SIGMAA-QL as an ambassador of mathematicians interested in these issues. The organizers will come in with questions to initiate and facilitate the conversation, but we invite everyone interested to come and make their voices be heard.

The annual business meeting of the SIGMAA will also be held at MathFest—all are welcome to attend and have a voice in planning for the next year!

## Joint Mathematics Meetings 2020

**Denver, Colorado, 1/15/2020-1/18/2020**

The Joint Mathematics Meetings will be held in Denver, Colorado in 2020. We hope to offer a number of rich experiences to support the Quantitative Literacy community. Watch our mailing list for details as those opportunities are announced!

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