FINAL COMMENTARY

LOOKING BACK ON OUR SELECTED WRITINGS FROM FIFTY YEARS OF *DELTA-K*

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Looking back on it now, our approach to choosing the 50 articles was, in essence, to solve a simpler problem. In other words, we decided to first worry about whether or not we could accurately reflect and celebrate *delta-K* and the teaching and learning of mathematics in Alberta for one decade—just one. But, where to begin? We began with the seventies because there was no doubt (for either of us) that we had to include an article on the metric system. Our task had now been "reduced" from fifty articles from fifty years to nine articles (and one article on the metric system) from the seventies. While our concerns were not fully alleviated by the end of our discussion, we both agreed that reading through the ten years of *delta-K* from the seventies and putting together our own top ten lists (plus a few "extra" articles) was a manageable task. At this point we went our separate ways (for a few weeks).

Given the number of articles that were published in delta-K during the seventies, there was a good chance that the next time we convened our lists would not contain any of the same articles. Fortunately, this was not the case.

Selected Writings from the Journal of the Mathematics Council of the Alberta Teachers' Association, pages 459–466

However, as we soon found out, just because we both had a number of the same articles on our lists, our task was not any easier. Case in point: While we both had a metric system article on our list, it was not the same article.

Once we had agreed on which metric system article to include and, more importantly, why we were including it, we then discussed the articles we both had in common on our lists, the articles one person had on their list and the other person had on their "extras" list, the articles that only one person had on their list and, finally, any articles that only one person had on their extras list. This discussion, and our ensuing "escalated" discussions, was, in essence, our process for choosing our fifty articles to represent 50 year of *delta-K* and the teaching and learning of mathematics in Alberta.

Of course, and as others have pointed out in this volume, we do not contend our 50 articles to be "the" or even "the most representative" articles from the past fifty years. There is no doubt, if different individuals were to conduct the same exercise, they would come out with a different set of articles. In fact, if we were to conduct the exercise over from scratch—either knowing what we know now or, for that matter, not knowing what we know now—we, too, could have come out with a different set of articles. Many times, our decision to include one article instead of another was not easy. For example, there were numerous instances where a chosen article was taken out based on a subsequent discussion. Then, in other instances, an article originally "in" and then "out," was put back in again. Looking back, we thoroughly enjoyed this part of the book project.

Given the success that we had with our top ten (plus extras) list approach, we used the same process for each of the next four decades. Once we had a better picture of the entire 50 years, that is, once we had completed our task for three of the five decades, we soon realized that our approach of treating the decades (somewhat) independently was not going to hold up. As such, once we completed our task of finding ten articles for each of the five decades, we now had to look back at the entire 50 articles, as a whole.

Once again, in the interest of full disclosure, our final 50 articles were "set" a number of times. In fact, certain articles that we had included and then excluded at the "decade level" came back into the mix at the "anniversary level." Our anniversary level discussion definitely impacted our decade level decisions. For example, over the past fifty years there have been certain individuals who have published in *delta-K* more than others. However, you will not find a representative number of their articles in this volume. This decision, along with many others, was made early on at the decade levels, and was strictly enforced once we were at the anniversary level. Finally, we had our 50 articles.

In terms of the book, choosing 50 articles was but one component of our project. Key for us and the book (and we hope you agree) was to have each decade begin with an introduction providing historical context, and

conclude with a commentary providing a contemporary view of the themes emerging from each decade, each from prominent members of the Alberta mathematics education community. We were extremely fortunate (thanks to the hard work of Gladys) to have: Liedtke and Kieren, Puhlmann and Pimm, Bonifacio and Loewen, Smith and Simmt, and Mercer and Chapman provide (respectively) the introductions and commentaries for each of the decades. Consequently, in the space that remains, we wish to provide a few brief comments on *delta-K* and the teaching and learning of mathematics in Alberta over the past 50 years.

As mentioned, for us, the article we included on the metric system was unique, in that we used it as a starting point for the book. However, that article is also unique in another manner: its topic, the metric system, was found only in one decade, the seventies. For the most part, topics that appeared in *delta-K* over the past 50 years either appeared in a few decades or in all five decades. These topics are now commented on in turn.

A common thread between the diverse topics that appear in a few, but not all, of the first five decades of *delta-K* is the "backward and forward compatibility" of the topics. Topics that appear in some, but not all, of the first five decades of *delta-K* are, in a sense, "forward compatible," but not necessarily "backward compatible." Let us provide an example. There is no doubt that articles on math teacher anxiety, appearing in the pages of *delta-K* in the 1980s and 1990s, have appeared in subsequent issues of *delta-K* (in the 2000s) and, further, will continue to appear in future issues of *delta-K*. After all, math teacher anxiety is an established area of research in the field of mathematics education and this research is now in the hands of mathematics teachers in classrooms around the world. However, working in the "other" direction for a moment, having an article on mathematics teacher anxiety published in the early 1960s seems a little less plausible. Consider the following thought experiment. Imagine a smoke-filled teachers' lounge in the early 1960s where people (read: men) are pouring over recent submissions to *delta-K*. There are five slots left for articles and six articles to choose from. The topics of the six articles are: geometry, logic, deduction, proof, axioms, and mathematics teacher anxiety. It is just our conjecture, but we think we know which one of those topics did not belong—at the time. To be clear, mathematics teacher anxiety (most likely) existed, but did not appear in the pages of *delta-K* (and other journals) in the 1960s. In other words, we are not arguing that mathematics teacher anxiety did not exist in the sixties; however, we are arguing that if one had mathematics teacher anxiety it was probably not discussed and, surely, as a topic would not grace the pages of a mathematics teacher journal. The same is probably true for a number of other issues in the sixties, that is, they (most likely) existed, but were not discussed in mathematics teacher journals.

Times change and, at some point in the nineties, the math-teacher-anxiety-bell was rung. As one knows, it is hard to unring a bell. The topics that have appeared in a few, but not all of the decades of *delta-K* (e.g., gender, anxiety, Indigenous knowledges, and others mentioned above) represent important moments in the history of the teaching and learning of mathematics in Alberta.

Topics that appeared in a few of the decades of *delta-K* are diverse in nature. Articles concerning the mathematics teacher become predominant, albeit in different forms, from the seventies onward: teacher preparation in the 1970s; teacher as facilitator in the 1980s; math teacher anxiety in the 1990s; and professional development in the 2000s. Other topics, such as gender, the use of literature, and theories of learning (especially from the field of psychology) appear in articles from the eighties onwards. Topics such as constructivism, manipulatives, problem solving, anxiety, equity, and multiculturalism appear in the pages of *delta-K* from the nineties onwards. In the aughts, topics included humanism, the influence of cognitive science, Indigineous knowledges, and applying mathematics to real life.

As we continue our look back over the past 50 years, a few topics stood out. For example, as seen in the articles in this book, the University of Alberta has long been a hub for research in mathematics education in Canada (and beyond). As another example, which we attempted to capture in the "Researcher in the Classroom" chapters of this book, research, although different over the decades (e.g., methodology), has been a consistent component of the mathematics teaching and learning scene in the province of Alberta. Further, a number of themes have been a mainstay for nearly half a century, that is, certain topics have appeared in each of the past five decades of *delta-K*.

There have been two related questions, albeit in different forms, that have continued to crop up over the past 50 years: (1) Why teach mathematics, and (2) What is mathematics? Different versions of these questions and different responses are preserved in the pages of *delta-K*. Looking back to the articles from the sixties, there appears to be little doubt of the status held by geometry. Reading the articles from the sixties, logic, deduction, proof, axioms, and rigour represent the very essence of mathematics and why mathematics was being taught: to teach logic, deduction, proof, axioms, and rigour. However, as seen in the articles from the very next decade, geometry was not necessarily on the way out, but was, if you will, knocked a bit off of its perch. For example, articles from the seventies began to address teaching mathematics for different reasons. In addition, calculus was also being questioned as the holy grail of school mathematics. If calculus, then, was not at the peak of Mount School-Mathematics, what topic would take its place? As documented in the pages of *delta-K*, statistics became a new topic for the mathematics classroom. Statistics courses, being given

further consideration in the eighties, were accompanied by specific courses for those who did not "like" mathematics. These courses were put "on the books" and were tried to various degrees in different schools. Due in part to the developments of previous decades, the related questions of "why teach mathematics" and "what is mathematics" resulted in "new" topics, such as estimation, mental math, problem solving, numeracy, and number sense. Said topics have become mainstream and, concurrently, lightning rods for those involved in the teaching and learning of mathematics.

Questions surrounding the nature of mathematics and mathematics teaching have been a mainstay in the pages of *delta-K* over the past fifty years. Interestingly, questions of this nature show no signs of abating. Recent articles by Andrew Hacker (in *The New York Times*), Nicholson Baker (in *Harper's* magazine), E. O. Wilson (*The Wall Street Journal*), and others are currently questioning the necessity of the teaching and learning of mathematics. Further, other individuals such as Arthur Benjamin—who advocates for statistics, not calculus, as the peak of Mount School-Mathematics—are questioning certain aspects of the teaching and learning of mathematics. Of course, those (too) close to the topic are up in arms over presentations and articles of this nature. What may appear to some as present-day arguments over the nature of mathematics and the teaching and learning of mathematics, we see, have been appearing and are preserved in the pages of *delta-K*.

This volume also demonstrates how central certain organizations and associations have been to the teaching and learning of mathematics. The articles from the sixties show not only the establishment of provincial organizations—the British Columbia Association of Mathematics Teachers (BCAMT), the Mathematics Council of the Alberta Teachers' Association (MCATA), the Saskatchewan Mathematics Teachers' Society (SMTS) and others—but also the close ties between those organizations during the early years. Looking beyond provincial borders, the pages of *delta-K* preserve the attempts to establish a Canadian Association of Mathematics Teachers in the seventies, which as discussed in this volume, may live on in the form of the Canadian Mathematics Education Forum (which will be held for the fifth time in 2014). The notion of a Canadian mathematics teacher society or association, we contend, had to have been influenced, in part, by the national mathematics teacher organization south of the border: the National Council of Teachers of Mathematics (NCTM).

As evident in the pages of *delta-K*, the MCATA became involved with the NCTM early on. In addition to the official affiliation of the MCATA with the NCTM, the influence of the NCTM on the teaching and learning of mathematics in North America has been felt in Alberta. As we move through the pages and decades of *delta-K*, we see the moves of the NCTM from the eighties (e.g., *An Agenda for Action*) to the nineties (e.g., the various Standards)

to the aughts (e.g., the Processes and more recently the Common Core Standards) and resultant changes to the teaching and learning of mathematics in the province of Alberta.

It is important to note that the aforementioned provincial organizations have continued to develop and strengthen. The MCATA (and, for that matter, the BCAMT and SMTS) continues with strong membership numbers, holds annual conferences, and consistently publishes issues of its journal. Albertan members continue to play a role in regional, national, and North American conferences, associations, and organizations, which will continue to influence the teaching and learning of mathematics in the province of Alberta (and beyond). Said influence is especially true on the use of technology in the mathematics classroom.

Articles on technology have been consistently found in the pages of *delta-K* over the past 50 years. Technology has increasingly become an integral part of the mathematics classroom; however, as seen in the articles chosen for this volume, the technology under discussion changes with the decades. As we move from the sixties to the seventies to the eighties to nineties to the aughts, the focus shifts, respectively, from the beginnings of the use of the microcomputer to calculators becoming a staple of the math classroom (as they replace the slide rule and various math tables) to the microcomputer's main foray into the classroom to the domination of the graphing calculator to dynamic software. (We hope you enjoyed, as we did, the article on use of the overhead).

The articles in this book allow us to see that although the technology under discussion changes, many of the issues remains the same. For example, we see, from the articles in the sixties, that the beginnings of the use of microcomputers in the mathematics classroom had a focus on rote learning. Similarly, today, many of the "apps" dedicated to the teaching and learning of mathematics also focus on rote learning. As another example, there are similarities between the modern-day discussions of Massive Online Open Courses (MOOCs) and the previous discussion of using the videocassette recorder, better known as a VCR, during the 1980s. The impact of technology can be seen in courses such as geometry where the approach to teaching the topic, which clearly has changed since the sixties, has embraced technological advances (e.g., dynamic geometry software).

According to Moore's law, many of the digital electronic devices in the mathematics classroom will continue to improve at (approximately) an exponential rate, which means (and we have no qualms in saying it here): Technology is not a passing fad. Further to this point and for those who are still hung up on the good ol' "calculator debate," we ask that you start to embrace other forms of technology into your discussions and debates on how technology should be used in the classroom. Some such as Conrad Wolfram have made the case for "Computer-Based Mathematics," which, in

essence, would eliminate calculating from the mathematics classroom; of course, this notion is a foundational source of contention with the various forms of the new math.

The "new math" is a prominent topic that has appeared in many pages of *delta-K* over the past 50 years. However, what is meant by new math has (also) changed over the past 50 years. The term "new math" being thrown around today means something entirely different than when the term was used in the 1960s. (Ah the sixties, a simpler time when the "new math" actually meant "new math.") There is no doubt that the "new math" and the math wars have had a major impact on the teaching and learning of mathematics. As seen in the pages of *delta-K*, many of the main topics under discussion (e.g., approaches to the teaching and learning of mathematics; the use of technology; whether mathematicians or mathematics educators should be writing the curriculum, assessment, and exams; the readability of textbooks and others) can be couched within a "new math" discussion.

As demonstrated, on the one hand, certain topics (e.g., anxiety and others) have graced the pages of *delta-K* for but a few of the decades since the beginnings of the MCATA. On the other hand, also as demonstrated in this volume, certain topics (e.g., technology) appear in all five decades of *delta-K*. While, to us, it has been interesting to see when particular topics made their way into *delta-K*, we are particularly fond of those topics that have appeared in all five decades.

Topics that have appeared in all five decades of *delta-K* have provided us with many opportunities to get "lost" in this book. (Worthy of note, this is not a last-ditch effort during the penultimate paragraph to try to convince the readers that this is a good book.) Consider, for example, certain discussions on technology that are found in the pages of *delta-K*. Sure, the conversation during the eighties was specific to the VCR, but when one swaps out a tape in the VCR for, say, a YouTube video on a tablet or a MOOC presentation, much of the conversation is similar. Likewise, the discussion found in the pages of *delta-K* during the seventies—when the calculator was replacing slide rules and log tables—has many components of the eventual conversation that will occur once we stop printing Z-tables in our math textbooks (those texts that are just "too wordy") and, finally, just let students use their graphing calculators (or, more accurately, their graphing calculator apps they will have on their tablets). Getting "lost" in this book also occurs for topics other than technology. Consider, as one last example, the articles that we have read through the decades about the new math and the curriculum. Certain discussions on this topic could be pulled out of an article and it would be near impossible to establish which decade the article was from: "Clearly, we need to get back to basics." Whether this statement stems from the new math and back-to-basics discussion from the sixties and the seventies or from the last few years (when the math wars made their

way to Canada) is hard to determine. Yes, more context would allow one to better guess which decade the comment originated from, but that is not the point. The point is that certain topics (e.g., new math, technology, and others) transcend decades.

Jean-Baptiste Alphonse Karr once said, "plus ça change, plus c'est la même chose." This aphorism, loosely translated, states: "the more things change, the more things stay the same." As demonstrated, certain topics, especially those found in all five decades of the existence of the MCATA and *delta-K* (e.g., the nature of mathematics, why teach mathematics, mathematics teacher organizations and associations, technology, curriculum, new math, the math wars, and others) do change; yet they also, at a deeper level, stay the same. We want to be clear, although Karr's aphorism can be considered pessimistic, we do not believe pessimism applies in this particular situation. First, we use Karr's aphorism to draw attention to an important point: *delta-K's* housing of significant topics on the teaching and learning of mathematics. Second, and finally, this is, after all, a *celebration* of 50 years of *delta-K*, the Mathematics Council of the Alberta Teachers' Association, and the teaching and learning of mathematics in the province of Alberta—a celebration that we hope you have enjoyed as much as we have.

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The teaching and learning of mathematics in Alberta—one of three Canadian provinces sharing a border with Montana—has a long and storied history. An integral part of the past 50 years (1962–2012) of this history has been *delta-K: Journal of the Mathematics Council of the Alberta Teachers' Association*. This volume, which presents ten memorable articles from each of the past five decades, that is, 50 articles from the past 50 years of the journal, provides an opportunity to share this rich history with a wide range of individuals interested in the teaching and learning of mathematics and mathematics education. Each decade begins with an introduction, providing a historical context, and concludes with a commentary from a prominent member of the Alberta mathematics education community. As a result, this monograph provides a historical account as well as a contemporary view of many of the trends and issues in the teaching and learning of mathematics. This volume is meant to serve as a resource for a variety of individuals including: teachers of mathematics, mathematics teacher educators, mathematics education researchers, historians, and undergraduate and graduate students. Most importantly, this volume is a celebratory retrospective on the work of the Mathematics Council of the Alberta Teachers' Association.

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