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VIEW POINT

The Math Ed Majors: Golf Edition (Part I)

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Abstract The purpose of this article is to identify, from the plethora of journals dedicated to publishing research in the field of mathematics education, in general, and from mathematics education's 'Group of Seven', in particular, what I call the Math Ed Majors. In order to do so, I look to men's professional golf, and men's major golf championships. Worthy of note, there are only four majors in men's professional golf. As such, I pronounce only four journals as math ed majors. Recognizing that I may ruffle some feathers, I take into consideration, as has been done in men's golf, scenarios where there are only three or perhaps five majors. Also taking into consideration that I am constantly on the lookout for and have a vested interest in Canadian mathematics education matters, because if Canadian mathematics education matters then Canadian mathematics education matters, I provide an honourable mention by drawing parallels between a prominent journal and the Canadian Open. After a bit of translation, necessary for a brief aside where I speak Canadian, I allude to Part II of this manuscript, proclaiming the Math Ed Majors with the explicit purpose of introducing brand-new, unconventional, professional golf–based author productivity indexes.

Résumé Dans cet article, mon objectif consiste à identifier, parmi la pléthore de revues consacrées à la publication de travaux de recherche dans le domaine de l'enseignement des mathématiques en général, et dans le « groupe des sept» de l'enseignement des mathématiques en particulier, ce que j'appelle les « [revues] majeures de l'enseignement des mathématiques». Pour ce faire, je me tourne vers le golf professionnel masculin et les omniums les plus importants du golf masculin. Il convient de noter qu'il n'y a que quatre tournois majeurs dans le golf professionnel masculin. C'est dans cette foulée que je choisis de ne qualifier « de majeures» que quatre revues du domaine de l'enseignement des mathématiques. Conscient que je risque de froisser certaines personnes, je tiens compte, comme cela a été fait dans le golf masculin, des scénarios dans lesquels il n'y aurait que trois ou peut-être cinq [revues] majeures. Prenant également en compte le fait que je sois constamment à l'affût des sujets qui touchent à l'enseignement des mathématiques au Canada et que je m'intéresse de près à ceux-ci, puisque si

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l'enseignement des mathématiques au Canada est important, alors c'est important, j'accorde une mention honorable en établissant un parallèle entre une revue de premier plan et l'Omnium canadien. Après un peu de traduction, nécessaire le temps d'un bref aparté durant lequel je parle « canadien», je fais allusion à la deuxième partie de ce manuscrit, parce que je proclame que j'ai établi quelles sont les revues les plus importantes (les « majeures») de l'enseignement des mathématiques dans le but explicite de présenter de tout nouveaux indices de productivité des auteurs, non conventionnels et fondés sur le golf professionnel.

Keywords Golf · Group of Seven · Indexes · Journals · Journal rankings · Major championships · Majors · Math Ed majors

The relative prominence of journals in the field of mathematics education relies, I contend, on standard, arguably tired, metrics. Journals, for example, are given numbers, a ranking, or put into tiers, and everyone, eventually, after the initial uproar, goes about their business. Even more "clear-cut" metrics, like letter grades given out in a math class (A+, A, A−, B+, B, B−, C+, C, C−, D+, D, D−, and F), albeit without the corresponding percentage bands (e.g., "A" equates to percentages ranging from 86% to 100% for some but not others), are sometimes attached to journals, which, in essence, gives them a grade, which can also be hard for a journal to shake. Citation indices, metrics, and impact at the journal level, for example, journal impact factor, while meant, in a sense, to squash debate because numbers do not lie, are vulnerable to critique which, in a twist of fate, furthers debate on which journal is "better" relative to a different journal. The purpose of this article, then, is to provide an entirely new criterion for which to compare the relative prominence of journals in the field of mathematics education. In what follows, professional golf tournaments, in general, and men's major golf championships, in particular, will be used to provide an entirely new perspective with which to rank/tier/categorize/grade/classify/sort/list/pigeonhole journals dedicated to mathematics education.

A Primer on Professional Golf

A quick primer, but, first, a quick disclaimer. A similar argument, for this article, could have been presented in terms of women's professional golf, men's senior professional golf, or, for that matter, men's or women's professional tennis. After all, "major championships," also known as "majors," or "slams" in tennis, are the currency with which success-success is measured in professional golf and professional tennis. Men's professional golf was chosen because of my decades-long following of men's professional golf and the corresponding majors.

I would be remiss not to mention that my knowledge of professional tennis is similarly deep. Unlike in golf, men and women play the same four major championships each year, which means, as I think about it, I do not preclude a future article in which journals in the field of mathematics education are compared to the four major championships in tennis. The Math Ed Slams, if you will. By way of example, the *Mathematics Education Research Journal* or *Mathematical Thinking and Learning* could, perhaps, be anointed one of the coveted math ed majors, from a professional tennis perspective, due to comparisons drawn between (1) the journal and mathematics education and (2) men's or women's professional tennis and the Australian Open, which is one of the four major championships, or Grand Slam tennis events. For the record, both being tied to Australasia is but a starting point. But, before I get ahead of myself and start declaring the Math Ed Slams, back to professional golf and my announcement of the Math Ed Majors.

Professional Golf Tours

The PGA Tour, at its core, is a meritocracy. As you might imagine, getting on the PGA Tour is no easy task. Those who make it on the tour hold what is called a PGA Tour card. Keeping a Tour card is similarly no easy task. However, play really well, say, win a tournament, you automatically get to keep your card for 2 years. Win more prominent tournaments, for example, one of the World Golf Championships, and you get to keep your card for 3 years. In addition, golfers that win tournaments are granted exemptions. Instead of having to qualify for certain tournaments, winners of golf tournaments are invited to play in other tournaments because, well, they are winners. Ultimately, the easiest way to get and keep yourself on the PGA Tour is to play some of the best golf in the world, preferably, all of the time.

If you were one of the best of the best, looking to play against the best of the best, then you would play and try to win tournaments that were part of the PGA Tour. The PGA Tour, arguably, was a professional golf monopoly, and had a long reach. The PGA, the organization, that is, has/had a European Tour, a developmental tour, a "Canadian Tour," and more feeder tours that all fed to the PGA Tour, which toured North America where *the* pros would play a schedule of tournaments in different cities as they toured, primarily around the United States of America. For years and years and years, the best golfers in the world congregated on the PGA Tour. It is important to point out, however, that men's professional golf, in recent years, has been in a state of tumult.

Ultimately, the pinnacle of playing golf, professionally, as men, was to play on the PGA Tour. Then, just recently, the Saudi Arabian Public Investment Fund (PIF) started a rival professional golf tour, LIV Golf, which was unheard of at the time. Speaking of at the time, at the time of this writing, the PGA Tour and LIV Golf Tour saga is still being played out. Things are happening fast, but it would appear that shifting sands are firming up and the PIF is now a part of the PGA. There are still two tours, which means the best golfers in the world, unlike in the past, are not all playing against each other in tournaments for now. To be honest, this development was almost enough for me to throw my hands up and rewrite this article from a tennis perspective.

The thing is, neither the PGA Tour nor LIV Golf runs the most important of the professional golf tournaments, the four major championships. The best players in the world, despite their being two tours at the time, do all play against themselves four times a year in the major championship. In other words, despite the major tumult with the PGA Tour and LIV Golf, despite a potential merger between the tours, the major championships are still the major championships (for now). They are the major measure, perhaps now even more of a major measure with the two tours, with which to measure success in professional golf, no matter the metric.

Major Championship Success

There are many different ways to measure success in the world of men's professional golf. There are monetary approaches, such as comparing the amount of prize money a golfer has amassed either per year or over their entire career. The accumulation of varying awards—such as the Professional Golf Association (PGA) Player of the Year or the Vardon Trophy (for the lowest scoring average)—is also indicative of success. Even certain sponsorships, Rolex as opposed to Kia, for example, can be correlated with golfing accomplishment. By and large though, success in professional golf comes down, as mentioned before, to winning golf tournaments.

Winning golf tournaments, it should be noted, begets many of the other measures of success just mentioned. For example, win enough golf tournaments in a particular year and your name would probably be in the running for PGA Player of the Year and other awards, such as the Arnold Palmer Award, which is given to the player with the most money earned in a season. As another example, winning

golf tournaments equates with more air time on network television, which definitely results in more sponsorship opportunities. So, win golf tournaments, a measure of success, and other measures of success will surely follow. As alluded to, in the world of professional golf (and professional tennis), not all tournaments are created equal.

The absolute key to immortality in professional golf is winning *major golf championships*, which are simply known as the *majors*. Amongst all of the professional golf tournaments held on all of the tours all over the world, there are only four majors, which are each held once a year: the Masters Tournament, the PGA Championship, the US Open, and The Open Championship (often incorrectly called the British Open). Win a major, your name is entered into the history books forever. Win two majors, your legacy in professional golf is unassailable. Three majors, you easily just punched your ticket to the World Golf Hall of Fame. Four majors, only two handfuls of people have ever done that. Win more than four majors, your name becomes part of an exclusive, exclusive list (currently comprised of 20 people) simply known as the greatest golfers to ever play the game. After all, once you start talking about major wins, all of the other metrics (e.g., prize money, awards, sponsorships) melt away from the conversation.

Mathematics Education Journal Rankings

As mentioned at the beginning of this article, I am looking to frame the relative prominence of journals in the field of mathematics education relative to major golf championships. A ranking, really an identification, of four journals from all of the other journals in the field. Ranking mathematics education journals is not new (see, for example, Dreyfus, 2006a, b; Toerner & Arzarello, 2012; William & Leatham, 2017). Prior approaches to ranking journals are varied.

Toerner and Azarello (2012) utilized classroom grades (A*, A, B, C) in their ranking of 17 journals well known to nearly 100 experts in the field. For example, *Educational Studies in Mathematics* (*ESM*) and the *Journal for Research in Mathematics Education* (*JRME*) both received a grade title of A*. The authors' grading process resulted in an A for *For the Learning of Mathematics* (*FLM*), *The Journal of Mathematical Behavior* (*JMB*), *Journal of Mathematics Teacher Education* (*JMTE*), *Mathematical Thinking and Learning* (*MTL*), and *ZDM: Mathematics Education* (*ZDM*). The reader is invited to see Toerner and Azarello (2012) for those journals receiving a letter grade of B and C. Years later, Williams and Leatham (2017), building off of Williams (2008), also took a look at mathematics education journal quality.

Williams and Leatham (2017) presented two studies—one based on citation frequency and another on expert opinion—to rank the relative quality of 20 journals that predominantly publish research in mathematics education. Focusing attention just at the "top," the results from the two studies are strikingly similar. The results of the study concluded that *ESM* and *JRME* were the most cited and respected journals in the field and not by just a little bit but, in their terms, "by a substantial margin" (p. 389). *ESM* and *JRME* were attached with the moniker of "Very High Quality Journals" (ibid.), whereas the likes of *JMB*, *ZDM*, *JMTE*, *MTL*, and *FLM* were designated as "High Quality Journals" (ibid.). Whether classroom grades or quality qualifications, the work of Toerner and Azarello (2012) and Williams and Leatham (2017), which was similar in terms of results, helps in establishing, at least in part, journals in the running as potential mathematics education majors.

The top tier (a term used in one of the studies) of journals in the field of mathematics education is, currently, arguably, comprised of a (unrelated to the Algonquin School, of course) Group of Seven. Presented here in alphabetical order, and with apologies for any incorrect use of how the "The" is supposed to be used in a journal's title: *Educational Studies in Mathematics* (*ESM*), *For the Learning of*

Mathematics (*FLM*), *The Journal of Mathematical Behavior* (*JMB*), *Journal of Mathematics Teacher Education* (*JMTE*), *Journal for Research in Mathematics Education* (*JRME*), *Mathematical Thinking and Learning* (*MTL*), and *ZDM: Inte Mathematics Education* (*ZDM*). Not presented in alphabetical order, that is, presented based on many different metrics (e.g., citation numbers, previous rankings), *ESM* and *JRME* do separate themselves from the Group of Seven; thus, a top-top tier within the top tier of journals, which will be renamed the top tier. The top tier of journals, *ESM* and *JRME*, is followed by a second tier, which includes *JMB*, *ZDM*, *JMTE*, *MTL*, and *FLM*, which is followed by third and fourth tiers. There you have it, definitely a strong enough pool of journals, in my opinion, to identify the four (only four) math ed majors.

Before drilling down into the math ed majors, I will point out that there, of course, sits prominent journals in the lower tiers, which, based on my reading of previous rankings, includes the *Mathematics Education Research Journal (MERJ)*, *Research in Mathematics Education (RME)*, and *International Journal of Science and Mathematics Education (IJSME)*. On and on one can descend, eventually getting to the *Canadian Journal of Science, Mathematics and Technology Education* and others. Despite their lower status relative to other journals in the field of mathematics education, non-top-tier journals can also get compared to professional golf tournaments, just not major golf championships. For example, there are many, many prominent professional golf tournaments that PGA TOUR golfers are pleased as punch to win. As mentioned earlier, there are the World Golf Championships, which are very prestigious golf tournaments. The Memorial Tournament and the Arnold Palmer Invitational, by way of another example, are also prestigious professional golf tournaments because they are/were hosted by two of the biggest names in the history of professional golf, Jack Nicklaus and Arnold Palmer, respectively. Winning the TOUR Championship, the final event of the PGA TOUR each year where only 30 golfers that played the best all year get to tee it up, is a prominent tournament to win. Lest we forget the Canadian Open, which is the third oldest tournament after The Open Championship and the US Open. Great, great tournaments—not major championships.

The Math Ed Majors

In order to maintain consistency with the world of professional golf, I am only able, in what follows, to identify four *math ed majors*. In other words, before you start writing a Letter to the Editor or lambasting me on social media (follow me: @MatthewMaddux), the fact that there are only four major championships is beyond me. Perhaps you will disagree that the journals I chose as the four math ed majors do not correspond with the top four journals in the field of mathematics education. That is fine, and I would only note that you are missing the point of the exercise. For example, some people feel that the PGA Championship could/should be replaced as one of the four men's major golf championships. Whether it is one of the four best golf tournaments in the world is a matter of debate; what is not a matter of debate, however, is whether the PGA Championship is a major. The PGA Championship is a major. Period. On that note, let us begin identifying the math ed majors.

I contend and will elaborate upon below, the two top-top tier journals in mathematics education, *ESM* and *JRME*, be given math ed major status. Here is where I expect a little push back. The big issue, for later, is that things get tricky. With five journals (*JMB*, *ZDM*, *JMTE*, *MTL*, and *FLM*) and only two major spots remaining, which two other journals get anointed as math ed majors will require a delicate touch. It is not sufficient, then, to merely name four journals as math ed majors, rather an informed discussion detailing which journal best represents which major championship and why is warranted. Given that *ESM* and *JRME* have just been proclaimed as two of the four math ed majors, what follows is an identification of *which* golf majors they best represent.

The Math Ed Opens

I contend that *ESM* and *JRME* best exemplify *The Open Championship* and *The U.S. Open*, respectively. The "open" nature of these two golf championships lies at the heart of likening these two particular journals with these two particular major golf championships. Theoretically, these championships are open to everyone, that is, both professional and amateur golfers alike. Well, for the US Open, it is open to anyone playing golf at a high enough level, as recognized by the United States Golf Association through their handicap system (i.e., a portable number that represents your demonstrated golfing ability), and that qualifies for the tournament, which happens at numerous qualifying tournaments played before the tournament. In other words, as long as you are playing golf at a decent enough level, you can be considered for the tournament, if your game is on point. A similar story applies for The Open Championship; and, a similar argument applies for *ESM* and *JRME*.

The journals *ESM* and *JRME*, like the golf tournaments, are, to borrow golf parlance, "Opens" in that should you think you have a contribution to the field of mathematics education research, you are more than welcome to submit your research to either journal. However, just because you submit to the journal does not mean that your work will be published. After all, *ESM*, for example, considers major contributions to the field of mathematics education stemming from all research approaches. Absolutely key for *ESM*, however, elevated articles that would draw interest from an international audience. *JRME*, similarly, is dedicated to the curiosities of all those researchers and teachers who show meticulous inquiry into the teaching and learning of mathematics. Alternatively stated, although the journal is technically "open" to submissions from everyone, your math ed game needs to be at a high enough level, a global level, if you are looking to get published in either journal. You have to be playing at the very top of your game; you and your game have to be on par (pardon the pun) with others at the very top of their game. Similarities do not end with the open nature of the tournaments and the journals.

It is important to recognize that not all contributors are necessarily professionals. Whether talking major golf championships or math ed majors, the names of elite amateurs are also witnessed in the records. The manner in which amateurs join the field in golf, that is, through invitation or qualification, can be seen as paralleled in *ESM* and *JRME*. On the one hand, a graduate student or teacher (read: amateur, and definitely not in a pejorative sense) may be a co-author on a publication with a more seasoned professor of mathematics education (read: "professional," and also not in a pejorative sense), one who has been toiling away in the math ed majors for years. On the other hand, perhaps a graduate student, one who has recently finished their dissertation, publishes part of their globally recognized work stemming from their time as a PhD candidate in one of these journals which, in a symbolic sense, represents a qualifying of or a joining into the field of mathematics education.

Strength of field is an important factor that distinguishes a major golf tournament from lesser tournaments. A glance of past participants and winners of the US Open and The Open Championship, no matter the year chosen, shows a who is who of professional golfers at the time. The way in which these two tournaments are littered with the top professional golfers in the field is akin to the list of authors appearing in the issues of *ESM* and *JRME*. Pour through the issues of either journal and you stumble across prominent names, some of the biggest names in the field of mathematics education, as you go from issue to issue, volume to volume, year to year. The strength of field for *ESM* and *JRME* furthers the contention that these two journals be anointed as two of the majors in mathematics education. The international aspect all but cements my contention.

The US Open, yes, is the US Open. In other words, the US Open is the national golf championship of the United States of America. It is also much, much more than that. The US Open has as much, if not more, clout than any other golf tournament in the world. Although based in the USA, like *JRME*, the tournament, like the journal, is recognized on a global level. Similarly for The Open Championship. Called by some as The Open, because it is the oldest golf tournament in the world, and also because it

propagated the notion of "open" tournaments to other countries, The Open, while housed in the United Kingdom, like *ESM*, is global, as is *ESM*. Should you find yourself playing in the US Open or The Open Championship, then you can say, without a doubt, you are playing the game of golf at a global level. Similarly, as you leaf through the pages of *ESM* and *JRME*, you are reading the work of individuals contributing to research in the field of mathematics education on a global level. Given that both tournaments and journals operate on a global scale raises the question, then, of who is the best of the best of the best.

Classifying *ESM* and *JRME* as mathematics education majors creates a parallel to a conversation in the world of professional golf when it comes to identifying which of the four majors is considered the most prestigious of all majors. Typically, in the world of professional golf, those from the USA consider the US Open the most prestigious major, whereas Europeans consider The Open Championship the most important of all majors. Arguments for both sides abound. For example, arguments will be made that The Open Championship is the truest test of golf because it is played on a style of course that reflects and embraces the invention of the game of golf. US Open advocates will argue that they have mastered turfgrass management and agronomy and, thus, have created the toughest test in golf. Similar lines, I contend, are drawn when math educators are discussing *ESM* and *JRME*. Phrases, such as "Links golf is different golf than what is played in the U.S.A." can be easily transferred to discussions where people are able to identify a *JRME* article as opposed to an *ESM* having just read the abstract. Research housed in *JRME* is, as many argue, simply different than research housed in *ESM*, which leaves the matter of which is best still open to debate.

Confounding such a discussion, many North Americans will argue that the US Open is not the most prestigious of all of the major golf championships. The Masters Tournament, also housed in the USA, by many is considered the best of the best, but it is unlike an "open" championship, which brings us back to the identifying two more majors from the five remaining contenders.

The Math Ed Masters

People may disagree as to whether or not The Masters Golf Tournament is the most prestigious of all of the majors. What people are unable to disagree with, though, is The Masters is unique. First played in 1934, it is the only major that returns, every year, to the same locale, the famed Augusta National Golf Club. It is full of various traditions (e.g., Green Jacket, The Champions Dinner, Opening tee shot, inviting amateurs), and the tournament was started by, arguably, the greatest amateur golfer of all time, Bobby Jones. Key to this tournament, as opposed to the open championships described earlier, is that The Masters is strictly an invitational event. With certain established criteria (e.g., only the top 50 players in the Official World Golf Ranking get invited, no alternates), a penchant for inviting winning amateurs, and a life-long invitation to past winners of the tournament, the Masters hosts the smallest number of players to contest in a major. Based on the above description, our hand is tipped, clearly, as to which of the remaining five journals is identified as a major.

Certain comparisons between The Masters and *ZDM* are immutable. First and foremost, *ZDM* publishes invitation-only papers for their seven annual themed issues. A close look at the editors of said themed issues reveals a who's who of researchers in mathematics education. An even closer look, as is the case where past winners of The Masters golf tournament are found throughout the field each subsequent year, issues of *ZDM* are littered with authors (and editors) of past issues of the journal. Authors from previous issues, having gained further prominence in the field, are invited to edit particular issues, and previous editors are also found contributing articles to themed issues edited by other prominent members, which is similar to a particular tradition with The Masters.

There is no doubt, there are a number of benefits from winning the Masters Tournament. By way of but a few examples, the winner gets the opportunity to set the menu for what is called The Champions Dinner the next year, which takes place just before when the next tournament starts; they get a spot in

the Champions Locker Room; and, you are welcomed as an honorary member of the Augusta National Golf Club, which has many notable members (e.g., Warren Buffet, Bill Gates, Condoleezza Rice, and around another 297 others of the same ilk). Keeping with parallels with *ZDM*, successfully publishing on a particular topic in the field of mathematics education, say in *ZDM*, *ESM*, or *JRME*, could lead to invitation from the editors of *ZDM* to take the lead on themed issues in a subsequent year. The mathematics education equivalent of setting the menu for a champions dinner. Should you not win again, sure, you would not be setting the menu for subsequent champions dinners, that is, future themed issues, but that does not necessarily preclude you from taking part in the dinner as a diner, that is, as a contributor of an article to future themed issues. Other parallels between The Masters and *ZDM* also exist.

In terms of history, like The Masters, *ZDM* is one of the oldest publications dedicated to publishing research in mathematics education. With articles in *ZDM* beholden to internal peer review by the editorial board and external reviews from invited specialists, the influence wielded by the Augusta National Golf Club, the Club's Board of Directors, and Club Members, in the world of golf, can be compared to *ZDM*'s influence in the field of mathematics education. The clout of those involved with the journal, the clout of the editors of the themed issues, and the clout of the author contributing to the themed issues also exist at a global level of influence.

Lastly, as is proudly posted on *ZDM's* website, a survey revealed that each and every author would publish in the journal again. Similarly, when asking golfers, those who only get to dabble with playing in a few major golf tournaments, which they would definitely want to play in again, the answer, assuredly, is The Masters. For all of the reasons presented, *ZDM* clearly, albeit differently, joins *ESM* and *JRME* as one of the four mathematics education majors. At this point, now with four top-tier journals (*JMTE*, *JMB*, *MTL*, and *FLM*) vying for one remaining major, the task becomes a tad more arduous. A brief aside, however, makes the task just a bit easier.

The "Fifth" Math Ed Major

The way things are shaking out, *Mathematical Thinking and Learning* (*MTL*) will not be one of the four math ed majors. At first glance, this might appear, although it is no way meant to be, a besmirchment of the journal. Quite the opposite, I could not speak more highly of the journal. For me, *MTL* occupies a rather unique position in the field of mathematics education, one that, I contend, is paralleled in the world of men's professional golf: golf's unofficially-official fifth major, The Players Championship (TPC).

An important parallel to draw between The Players Championship and *MTL* is that The Players is considered, by all, golf's fifth major due to its well-established reputation. *MTL*, similarly, has a well-established reputation in mathematics education. This reputation, for The Players, is built upon many factors; strength and depth of field and the prestige of the course, TPC Sawgrass, to name but two. Further similarities can be drawn for those playing in The Players Championship and the other major championships (e.g., benefits and exemptions, especially for winning). Cementing the reputation of The Players, the criteria for who gets to play are stricter than any of the four major championships. As a result, the quality of the field, especially the lower tiers of the field, is higher than in the majors and the tournament is referred to as the deepest (some use the term toughest) field in golf. They also pay homage to the course by referring to the course as the "purest test." Combining the former and the latter, The Players, arguably, is the strongest field playing the toughest test of golf.

A strong reputation and a deep field are often descriptors that I hear from colleagues in the field of mathematics education when discussing *MTL*. These particular descriptors are heard and overheard when colleagues, at conferences and in other instances, are discussing new, important research articles in the field of mathematics education. Discussion of said articles typically takes some form of, "Well, I guess I should read that article. Where can I find it?" To which the other person responds, "It is in *MTL*." To which "That makes sense" or "Of course" is often the next response. Flipping through the

pages of *MTL*, akin to *ESM*, *JRME*, and *ZDM*, the strength of field becomes apparent rather quickly. The Players, denoted the fifth major, which is another waying of saying that, beyond the majors, it is the next most prominent tournament in golf, stemming from many of the characteristics the tournament shares with the majors, is an apt descriptor for *MTL*, in my opinion.

Even though The Players has long been considered golf's fifth major, many individuals, but especially golf historians and pundits, consider discussion of the addition of a fifth major championship as the worst form of blasphemy. Arguments about the sacrosanct nature of four major championships are typically followed with conversations concerning asterisks in record books and the importance of recognizing the history of the game. Those on the other side of the argument will often note the importance of embracing change (as was done with the rules of golf rather recently) and, just to dig the knife in a bit further, will refer to the US Amateur and The Amateur Championship (a.k.a., The British Amateur), which were once widely accepted as major championships. Just recently, however, a change was made that has some now wondering if The Players is closer than ever to becoming an actual, legitimate fifth major championship.

For years, the calendar for the majors was set: The Masters in April, the US Open in June, The Open in July, and the PGA Championship in August. Around 2007, The Players was moved from March to May, which had many believing the tournament was, perhaps, being given more consideration for major championship status. However, a decade later, when The PGA Championship was moved from August to May, The Players was moved back to March. With the move of the PGA Championship, professional golf now had its most prestigious ducks in a row: the Players in March, The Masters in April, the PGA Championship in May, the US Open in June, The Open in July, and the TOUR Championship in August. The calendar change for The Players, to and from May, is a long way of saying that the tournament still holds its unofficially-official title as golf's fifth major. Should the tournament, one day, gain major status, the golf world will be divided. On that day, however, I will have no problem in changing the status of *MTL* to one of the mathematics education majors. Time will tell. In the interim, back to identifying the final math ed major from one of *JMB*, *JMTE*, and *FLM*.

The "Final" Math Ed Major

The PGA Championship gets its name because it is the one major conducted by the PGA of America, that is, the Professional Golfers Association of America, which is different than the PGA TOUR, which is the organization of premier tournament professionals. The PGA of America is dedicated to and, thus, this particular tournament celebrates, *club* and *teaching* professionals. Different than touring professionals, those who make a living travelling around and playing different tournaments, club and teaching professionals dedicate their careers to a particular golf club, run the club, teach golf to the members and guests and much, much more. Essentially, club and teaching professionals, some with a game good enough to be a touring professional themselves, sacrifice their own game for the greater good of a club and teaching its members. With this descriptor, there is no doubt, at least for me, that the fourth of the mathematics education majors is *JMTE*. Allow me to explain.

As detailed in other articles on the matter (i.e., journal ranking stuff), there are clear reasons for *JMB* or *FLM* taking the spot as the final math ed major. However, the methodology that I have adopted for this article necessitates that *JMTE* be identified as the final math ed major. The synergy between the defining difference of The PGA Championship when compared to the other three majors and *JMTE* is too strong to be ignored. Said defining difference can be interpreted incorrectly, however.

The one big difference for the PGA Championship is that amateurs are not invited. Period. Sure, an amateur can sneak into the tournament by winning a different tournament or a few other ways, but the PGA Championship is for pros, more specifically, touring pros *and* club and teaching pros. Recognizing

that touring pros, those who dedicate their lives to getting better at playing golf, often have stronger games than club and teaching pros, this major reserves a certain number of spots, 20 in total for each year, just for club and teaching professionals.

As the tournament marches on, there is no more raucous moment than when a club or teaching professionals starts playing at a level that rivals the touring professionals. Sure, in the end, a touring professional will likely win the tournament, but should a professional who dedicates their game to their club and their members start to creep up the leaderboard, there is no better story, and it feels as if the entire watching world, patrons on the ground, announcers in the booth, and those watching on TV, want the club professional, the teaching professional, to win it all. Seeing a club or teaching professional do well in the tournament reminds me of leafing through the pages of *JMTE*.

For me, much in the same way the PGA Championship is held for two types of pros, touring and club professionals, *JMTE* is a journal that champions the work of two different types of mathematics educators. Flipping through volumes and issues of *JMTE*, you will see articles cowritten by researchers in the field of mathematics education, that is, the tour pro equivalent of a mathematics educator, with teachers of mathematics, that is, the club and teaching pro equivalent of a mathematics educator. With a liberal use of the term mathematics educator, that is, an individual involved with the teaching and learning of mathematics education at any level (e.g., math teacher, math instructor, sessional lecturer, mathematics teacher educator, and on and on), many articles in *JMTE* are much like the PGA Championship in that two different types of pros are a part of the same venue. Much in the same way that club pros names are littered throughout the field of The PGA Championship, the names of mathematics teachers are found as co-authors in articles appearing in *JMTE*.

Cementing the notion that *JMTE* occupies the spot of the final math ed major, the similarities between the aims and goals of the journal and the tournament are eerily similar. For example, *JMTE* looks to further teachers and teaching of mathematics at all stages, and The PGA Championship looks to cement and further the standards of professional golf and, also, promote participation and interest in the game. More succinctly stated, the organizations look to promote professional development of the game of golf and the teaching and learning of mathematics. With that said, The PGA Championship holds a unique spot amongst the four majors.

Plus or Minus Four Majors

The four math ed majors have now been declared. With *ESM*, *JRME*, *ZDM*, and *JMTE* (and *MTL*) having made the cut, discussion could be dedicated to those journals that are on the outside looking in, that is, having been excluded from the group. To begin said discussion, I wish to first discuss amongst the four journals that were stated as math ed majors. After all, not all four men's major golf championships are created equal.

While conversation, as presented, does exist about a move from four to five major championships in men's professional golf, which makes reference to women's professional golf where a fifth major was added, another conversation, one where the number of majors is reduced from four to three, also exists. In conversations that consider removing one of the majors, different tournaments are proposed.

Often, the PGA Championship is put on the chopping block or proposed in a major trade with another tournament, for example, The Players. For various reasons, The PGA Championship, when compared to the other three majors, is often considered fourth of the four majors in many respects. Instances are rare, when asking a touring professional which major they would most like to win, that they would pick The PGA Championship. Perhaps if, say, a touring pro's father was a club professional for their entire career, they might hold the tournament in high regard. Even then, though, actually picking The PGA Championship over, say, The Masters, in this hypothetical instance, is rare. Recent movement of the

tournament to a different month in the calendar year, unheard of for other majors, a change in format from match play to stroke play, and other arguments support the whittling down of the number of majors, but the PGA Championship is not the only tournament on the proverbial chopping block.

Speaking of The Masters, and this will be blasphemous to some, a case can be made for its removal from the major championship docket. After all, the other three major championships, The Open Championship, the US Open, and the PGA Championship, are all tournaments related to fundamental golf organizations. Respectively, said tournaments are the annual championships representing the Royal and Ancient (R&A), golf's governing body outside of the USA, the United States Golf Association (USGA), golf's governing body in North America, and the Professional Golfers' Association of America (PGAA), the organizing body for teaching and club professionals. The Masters, on the other hand, is run by a golf club. One of the most prominent golf clubs in the world, sure, but different than the official championship tournaments of the R&A, USGA, and PGAA. Just like that, conversation about demotion of two of the four most important golf tournaments in professional golf is underway.

Muddying the waters, any discussion of changing from four to three major championships leads, naturally, to discussions of swapping one major out for another major. Should the PGA Championship or The Masters lose its major status then which of those tournaments on the outside looking in should be anointed the new major, which brings me back to the declaration of the four math ed majors and those excluded from the group. Conversation of the four math ed majors, that is, *ESM*, *JRME*, *ZDM*, and *JMTE* (and *MTL*), does invite discussion of those excluded. Any conversation of reducing the number of math ed majors from four to three, say removal of *ZDM* or *JMTE* for some reasonable reason, the conversation of adding *MTL* back as the new fourth math ed major could be considered. Discussion of the addition of a fifth major, which I entertained and added *MTL* to the mix, might be met with a different journal, say *JMB* or *FLM*, with appropriate support to the argument. Never mind adding or removing a major, a different discussion might simply take umbrage with the four math ed majors I have declared and, through drawing different parallels to men's professional golf, have a different set of four math ed majors. All the while, it is important to remember that there are prominent golf tournaments other than the four majors.

An Honourable Mention

From the Group of Seven, two major math ed journals have been left out of the math ed majors, *FLM* and *JMB*. For some, this might be outrageous, and I can see their point. Given the methodology I have taken in this article, I can see their point, but I can also see that they would be wrong in their take. *FLM* and *JMB*, from a professional golf perspective, are not able to replace *ESM*, *JRME*, *ZDM*, and *JMTE* (and *MTL*) as a math ed major. There is an honourable mention that I would like to make, however.

Which tournaments were the major championships in men's golf have changed over time. Long ago, for example, two American and two British tournaments, the US Open and US Amateur and The Open Championship and The Amateur Championship, respectively, were considered the majors. Without getting too much further into the history, The Masters, which began in the mid-1930s, coupled with declarations from Arnold Palmer in the 1960s, somehow led to the current four tournaments being the majors. In addition to the US Amateur and The Amateur Championship once being majors, tournaments such as the Western Open and the North and South Open were once considered major championships, as well. All of which leads me to, you guessed it, the Canadian Open, my honourable mention.

First and foremost, the Canadian Open, like the US Open and The Open Championship, is a national open championship. Also like the other opens, the Canadian Open has a long and storied history. For a period of time, although never a major, the Canadian Open was considered the third most important professional golf tournament. The tournament has a long and storied history, having been played

annually since 1904, barring three notable exceptions. The Canadian Open, then, given the pedigree mentioned above, you guessed it, for quite some time, albeit quite some time ago now, was in the running as the officially-unofficial fifth major.

From the Group of Seven, I wish to note certain parallels between The Canadian Open and *FLM*. For example, The Canadian Open was originally organized by the Royal Canadian Golf Association, which became Golf Canada in later years. The founding editor of *FLM*, David Wheeler, with a distinguished career in England, too, made his way to Canada. Upon arrival, Wheeler was instrumental, with others, of course, in the establishment of the Canadian Mathematics Education Study Group/Groupe Canadien d'Étude en Didactique des Mathématiques (CMESG/GCEDM). The journal of which he is the founding editor, *FLM*, is published under the auspices of the CMESG/GCEDM. The parallels, then, between *FLM* and the Canadian Open are strong. While other parallels between *FLM* and the Canadian Open exist, there is one, in particular, that I wish to make explicit.

On the world stage, whether correct or incorrect, Canadians are known for being polite. Sometimes, polite to a fault. Canadians are also known for apologizing. Theories for why this is abound, but are better discussed elsewhere. One theory worth briefly mentioning is that being polite and apologizing profusely are a way in which to avoid controversy or disagreement, which is often presented in contrast to the way things are dealt with in the country immediately south of the Canadian border. I bring up the notion of polite, apologetic Canadians because I see these characteristics playing out when not ranking *FLM* as one of the math ed majors.

"So, *FLM* is *oot* of the majors, eh?" is how you might hear a Canadian mathematics educator reacting to the news that *FLM*, while a member of math ed's Group of Seven, was not declared one of the four math ed majors. "Wait, is this guy a *hoser* or does he know what he's doing?" would be a right proper follow-up question. Upon hearing of the others that made the major cut, you might hear, "Oh, '*Zed*'DM is a major, that's *aboot* right." Following things up further, I can even hear a colleague saying, "I guess this guy wasn't looking to cause a *kerfuffle*, but it looks to me he's started a *gong show* by not giving *JMB* a *hoose*." Please, allow me to translate.

Conclusion (Part I)

Any article attempting to address the relative prominence of journals in the field of mathematics education will, no doubt, cause a stir. I might not hear much from the supporters of *ESM*, *JRME*, *ZDM*, and *JMTE* because, after all, they made it, they are the four math ed majors. I might hear from proponents of *MTL* or *JMB* about how I have made a mistake in not declaring either journal as one of the math ed majors, and, for that matter, I might hear differently from people in different parts of the world. While I do not expect to hear from Canadians regarding *FLM*, because we are polite and apologetic, we have, in recent years, in my opinion, been slipping in civility.

I am sure I will hear from somebody about what I have done. Different countries are known for comporting themselves differently and I have left a lot, I mean a lot, of important journals out of this discussion. Consider, for example, *International Journal of Mathematical Education in Science and Technology*, *International Journal of Science and Mathematics Education*, *Mathematics Education Research Journal*, *Research in Mathematics Education*, *The Mathematics Enthusiast*, and *Canadian Journal of Science, Mathematics and Technology Education*. Fear not, as I have mentioned, there are many other prominent tournaments in professional golf. For example, there are four tournaments associated with the World Golf Championships (WGC). I mention this because WGC tournaments were created with the hopes of bringing together the best players from all over the world in venues other than the four major championships. Which of the four tournaments correspond to which tournaments is an

exercise for a different time (and perhaps a different person). There are also prominent tournaments outside the WGC like The Memorial and Arnold Palmer Invitational, and, believe it or not, The Waste Management Open is an important tournament for many golfers.

With the four math ed majors having been identified, here in Part I, some variation of "So what?" or "Now what?" or "Who cares?" enters the mix. Legitimate questions, no doubt. The answer lies, in Part II, with brand-new, albeit unconventional, professional golf–based author productivity indexes for the field of mathematics education. In other words, move over g-index, h-index, i10-index, p-index, and all other viable author productivity indexes. With math ed majors now in the mix, *the grand slam*, a term for winning all four majors in the same year, and all its variants (e.g., calendar slam, career slam, Tiger slam, runner up slam, and others), will provide those in the field of mathematics education with new terminology to discuss success in publishing research. Stay tuned.

Declarations

Competing Interests The author declares no competing interests.

References

Dreyfus, T. (2006a). *Citations of mathematics education research journals 2004–2006*. Unpublished manuscript.

Dreyfus, T. (2006b). *Refereed mathematics education research journals cited in PME proceedings*. Unpublished manuscript.

Toerner, G., & Arzarello, F. (2012, December). Grading mathematics education research journals. *Newsletter of the European Mathematical Society*, *86*, 52–54.

William, S. R., & Leatham, K. R. (2017). Journal Quality in Mathematics Education. *Journal for Research in Mathematics Education, 48*(4), 369-396.