QUEER TIME/MATH TIME

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This essay uses theories of 'queer time' to re-frame mathematics for mathematics educators as a 'queer practice' because, I believe, if teachers of young children can understand the non-linear and non-sequential experiential aspects of working mathematically, they will be able to find more satisfaction in their teaching, and their pupils will find more satisfaction in their mathematical experience. It is often thought that mathematics education needs to address issues of queer identities as part of a commitment to inclusive practices—that is, to honor LGBTQIA+ teachers and students (Leyva, Massa & Battey, 2016; Leyva, Taylor McNeill & Duran, 2022; Mendick, 2017; Moore 2021). Such efforts are critically important. Perhaps it is even more appropriate to say that mathematics education needs to turn inward and recognize its queerness, in order to provide the best opportunities for all students; that is, this is not about teaching children to be queer, but about honoring the queerness in all human experience, especially in mathematical experiences. I emphasize the queerness of *all* experience in that last sentence. I urge us to explore how a focus on the queerness of mathematics can help people to recognize the queerness of all human experience in general (Mendick, 2017). With this in mind, I first explore the question, "What is 'queer time'?" I will then address the follow-up questions, "Is mathematics 'queer'?" and, "If so, in what ways?" The essay then elaborates on how some popular descriptions of mathematicians at work can be understood as non-linear and non-sequential, existing in queer time. The potential in embracing the queerness of mathematics can then be considered as supporting the apprenticeship of learners in the queer time of mathematics.

Nothing in this essay is outrageously new. Many of us have seen many of the ideas before. Indeed, my readers might be curious about the fact that most of my references are rather dated, from the 1980s and 90s. What is new is the framing in terms of queer time. Ideas, often marginal despite their traction, can take new life if theorized in terms of queer time. By unraveling the intertwined relationships among mathematics and the plentitude of queer experiences, we might find new directions for our practice.

What is queer time?

In the field of queer studies, experiences of time and lifespan milestones as measures of time happen in different and non-normative ways for members of the LGBTQIA+ community (Freeman, 2007; Halberstam, 2011). Queerness is itself an outcome of strange temporalities, imaginative life schedules, and, from the normative social perspective, eccentric economic practices (Freeman, 2007; Shakhsari, 2014). Time warping experiences such as 'coming out', gender transitions, recognizing and understanding one's sexuality, coping with generation-destroying crisis such as the AIDS epidemic, and so on, characterize the lifeworld. Queerness is constituted by its differences from conventional requirements of time and life milestones. That is, queer time describes ways that queer life often does not follow expected sequences, and does not progress according to expected schedules. Slow understanding (over time) of non-normative experience, recognition of community, and establishment of personal relationship with one's identit(ies), form a cultural encounter distinguished by its lack of an 'appropriate' or expected sequence of experiences through which one achieves 'maturity'.

The analogy with mathematics takes various forms. First, despite historic attempts to identify optimum sequences of skill and concept lessons that are then organized into curriculum materials, research has also demonstrated a plethora of contradictory options, in which seemingly 'more advanced' techniques or topics can be used to make sense of what, in other sequences, are considered more fundamental (Confrey & Smith, 1995; Confrey & Scarano 1995; Davis, 2015; Kirshner, 2002). *When* a skill or concept is introduced, before, after or in-between others, and *when* it is partially or fully mastered or understood, because of its relationships with previously assimilated or understood mathematical skills or concepts, is often assumed to follow a standardized sequence. Yet, for example, fractions, ratios and proportions might help a child to comprehend characteristics of number and order, or, a comprehension of shape in spherical geometry might facilitate a learner's ability to convince others of a conjecture about triangles in plane geometry. Working with intuitive notions of infinity in pre-school (*e.g.,* singing, "it goes on and on my friend, some people started singing it, not knowing, just because, and they will keep on singing it, forever, just because") can support meaningful conversations about grouping and patterns. Despite a common notion of a codified, progressive set of milestones for learning mathematical concepts and standardized algorithms, actual experience and conceptual development is more nuanced, overlapping, spiraling, revisiting of concepts, reframing of previously learned material in terms of newly understood language and activity, and so on. The teachers and future teachers with whom I work often seek a set of best practices that are based on what David Tall (1976) referred to as a 'tree of knowledge' lattice model of conceptual development. Even if a tree structure is the basis for the mathematics in the curriculum, "The examples of twoway dependence in mathematics are legion, so the tree of concepts need not even be partially ordered. Surely what we are looking for are sensible ways of plotting the curriculum and there must be many such paths" (p. 15).

Another way to think of queer time for mathematics education is in terms of the ongoing development of one's relationship with mathematics. How does a learner slowly, over time, form a sense of themself as a mathematical actor

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in the world? As a student of mathematics, and a user or inventor of mathematics, as a consumer of mathematics, *etc.,* it is often tragically difficult for individuals to recognize and understand their mathematical identities, their mathematical relationships with others, the need to accept their interests in mathematics, and their needs to mature mathematically. For example, gender and mathematics anxiety research in the 1980s found that many women, who had abandoned mathematics as soon as they were allowed in high school, later learned highly specialized and advanced mathematical skills as adults, when they needed to, for important life practices. On the other hand, the concept of queer time challenges the notion that one needs to abandon particular practices or behaviors simply because one has 'aged out' of them. In queer communities, experiences of personal growth and 'adulting' are often described by a positive 'lack of chrononormativity' (Halberstam, 2005; McCallum & Tuhkanen, 2011). What might be labeled irresponsible or immature by some is seen as irrelevant and central to life, creative careers, and common practices for meeting and finding community by others. Refusing to conform to social norms of maturation might be compared in mathematics with a refusal to abandon forms of conceptual representation in favor of algorithms, or an insistence on exploring topics that were 'covered' in supposedly lower-level grades or courses.

In what follows, I use queer time to identify examples of mathematics education experience to develop a potentially useful theory of non-linear maturation and development in mathematics education. For example, consider the mathematician Erik Demain [1], who achieved fame and professional status by concentrating on origami and kiragami (paper folding and cutting). His 'childlike', enthusiastic interests have led him to produce work with numerous, sometimes unexpected, applications. Similarly, Vi Hart [2] created a new profession of 'mathemusician', and features her work as a YouTube blogger and prominent motivational speaker worldwide. Her video posts feature what some might think of as silly explorations—she even calls some 'doodles'—yet her explorations otherwise model sophisticated methods of working as a mathematician. In mathematics education, there is a strong sense that students need to mature in their abstract thinking and ability to transition among and across multiple representations; yet there is a parallel need to encourage playfulness and open-ended experimentation, suggesting potential paradoxes. Are these paradoxes in time, or do they exist outside of linear, sequential time? Such concerns have been explored in queer studies (Morris, 1998). They seem to call for a new relationship with queer time in particular. Embracing the playful refusal of a standardized sequence of 'growing up into a normative adult' changes the focus from adherence to maturation toward both confidence in one's own abilities to learn about oneself, and the embrace of autonomy in seeking out what one needs. These are also dispositions valuable for developing as a mathematical learner and actor.

My focus on 'time' is inspired by working with current and prospective teachers who seek to better understand the 'when' of assessment and the immediacy of the moments of pedagogical actions. Shifting from the ideal 'when' to the establishment of an environment rich in the potential for learners to develop such attitudes removes the pressure to do the absolute best instructional thing, replacing the pressure to be perfect with the motivation to free learners from normative, constricting curricular expectations.

Queer identities: is mathematics queer?

There is a common sense notion that people 'become themselves' as they live their lives, slowly but surely crystallizing a self with describable characteristics. This way of understanding human existence expects that a person can eventually describe important things about themselves, and that others might agree or disagree with these descriptions. Gender and sexuality might be reduced in this way to (fixed) 'identities', and the associated presumption that a person would be able to recognize these identities, either about themselves, or about others. The term for recognizing this for oneself is 'coming out'—this can be a personal and private experience, or a public declaration; the term for believing one can do this for another person is called 'outing'. A critical question for mathematics is, "What it would mean to 'come out?'" Indeed, "Come out as … what? When? In what time frame?"—As a student who loves mathematics? As a teacher of mathematics?

Queer individuals often ponder the analogous question. In the counseling literature, youth are encouraged to take their time in figuring out what they want to come out 'as'. Others encourage them to never 'fix' their identity through a coming out process, and to always challenge the current existing categories available for defining an identity. To come out is to lose one's vitality and to mourn the death of possibilities. Coming out is a controversial narrative in the context of queer time: Why come out? For whom and to whom? Why should one fix one's identity, as if it might be permanent, unchanging, and fixed from birth to death (Sumara & Davis, 1998)? In flows of time, back and forth, in and out, one is fluid, unfixed, always becoming, so that there is no identity to come out 'as', and therefore, the social and cultural expectation that one 'come out' is antithetical to living one's life as such a fluid, flexible being. Yet, there are both feelings of exhilaration and actions of political and social affirmation and support that coming out contributes for both the individual coming out, and for those who know about increasing numbers of people claiming an identity. The identity can promote feelings of acceptance and appreciation within a broader community. A comparative experience of affiliation and empowerment can, and I would say should, take place for learners of mathematics, as they establish relationships with others grounded in their own sense of themselves as one or another kind of mathematician or mathematical consumer.

If one chooses to delay or refuses to come out as claiming a particular identity, one's relationship with mathematics as an object of self would not be fixed and demanding of a moment of coming to terms with that identity. Instead, common practices in mathematics education that emphasize formative assessment, classroom discourse, and student self-assessment seem to require that individuals have the opportunity to exist in transitional spaces that specifically enable them to establish, change, realize, unfold, or promote new relationships with mathematics in general, and specific mathematical objects such as concepts and procedural skills for themselves and others. In this way, one would understand a 'teacher' as a facilitator of what D.W. Winnicott (2005) termed a 'good enough holding environment', a place where people potentially experience moments of being inside and outside of themselves as mathematical thinkers. The discourse of 'coming out' is increasingly replaced by practices of 'inviting in' (Rasmussen, 2004). The parallel shift for mathematics education would develop classroom practices that facilitate teachers and learners helping others to experience and better understand each other's personal relationships with mathematics, its joys, anxieties, wonders and forms of tedium, *etc*.

We might also say that encounters of, with and through mathematics are risky, in the sense that any specific moment of mathematical inquiry, discovery, frustration, contemplation, and so on requires a willingness to confront and embrace the very reality that 'one does not know what one does not know' (Ellsworth, 2004). How will this change me, or obfuscate possible ways that I could become someone who now 'knows'?—We do not know! Queer time helps us appreciate how to place the encounter as occurring within what Elizabeth Ellsworth (2004) terms a 'transitional space'. These transitional spaces can only be described after the fact, often using a non-sequential sense of 'when' the learning does and does not take place. It is only later that one can look back and realize that now, in what would have been the future, I can understand that I changed my comprehension of an important mathematical idea, or the context for a mathematical relationship or skill. It is in the past that the learning seems to always have been in the future. Only by projecting a vision of having found a solution or multiple solutions to a problem, can one practice retrodiction (Appelbaum, 2010), that is, to imagine an explanation that could have led to or caused something in the past, understanding that 'something' as once being a future of its own. It is only through bringing to life previous experiences with analogous problems, or questions, that I can in this new future, which is a present, pose my own conjectures, compose a new problem or question, establish a paradox that I can ponder. In this queer sense of time, past and present are often occurring within each other.

The initial dilemma of 'coming out' fixes an event in chronological time—that moment when a person 'comes out', acting on the decision to claim, in a past moment, that one will sooner or later make public a particular identity. That experience and the analogs with mathematical relationships are plural. These are not discrete moments, and not even a moment but a trajectory of ongoing, fluid recognitions. For example, in the coming out literature, one might come out to oneself, to friends or family, to a wider community, to a confidant, and so on, and any one or more of these might happen in any order. One might be outed by others without having come out to oneself; one might come out to family as one identity, only to come out to oneself and an intimate partner later as a different identity. One might be 'out' as different and conflicting identities in different communities or at different times in life. Similarly, chronological time constructs a false sense of learning, knowing, being mathematical, and so on. Does one 'know' what a number 'is', at any given moment of learning? Rather, it seems that one's relationship with 'numbers' is ever-changing, always shifting, different in different contexts and multiple communities of practice, at different times, often used for counting in early years, becoming in a typical school progression integers that later are situated within real and imaginary 'numbers' as part of a mostly linear sequence $\mathbb{N} \rightarrow \mathbb{Z} \rightarrow \mathbb{Q} \rightarrow \mathbb{R} \rightarrow \mathbb{C}$. Yet, Confrey and Scarano (1995) described integers as proceeding in the middle grades from ratios and fractions grounded in splitting and sharing in kindergarten and first grade; Davis (2015) designed a unit to establish exponentiation as a basic tool of interpretation rather than as an application or extension of what would otherwise 'come first' as 'basic'. Coming to know, as one explores a mathematical question, or attempts to create a solution as a response to a mathematical problem, takes on a trajectory of ongoing, fluid recognitions, self-doubt, tangential or irrelevant side paths, and the need to share that experience and explanations with an audience. In the articulation of one's story of a mathematical investigation, the need to compose a way of sharing the experience with others depends both on oneself and on the particular audience, with associated nuances related to what that audience can and cannot understand, what that audience is or is not ready to receive, and expectations about what that audience brings with them in terms of their own knowledge, assumptions, and expectations. In my students' stories of their investigations, they find it easier to use multi-path hypertexts than to string along a sequential, linear explanation of how their work progressed in time. When they attempt a time-line of what they did when, they need overlapping and intersection regions, and circuitous arrows, to describe what they were thinking and 'when', what triggered an idea, or how they only later realized the meaning of what someone else would describe as happening 'before'.

Is mathematics implicated in the existence of chronological, non-queer 'time'? That is, might mathematics be at least partially responsible for the very human phenomenological experience of queer time? We can ask this because time seems to be an instantiation of mathematics itself. Mathematics might be further implicated in other manifestations of fixed identities because of the quantitative nature of current instructional practices, and educational assessment. Perhaps it is appropriate to cast this as a caricature of mathematics that reduces the subject to certain forms of quantitative reasoning. Mathematics education would best create opportunities to study this phenomenon within its purview, that is, a version of mathematics education that does take this approach would be incorporating queer time in its unfolding practice: a self-critical analysis of time as a component of identity and fluid becoming. For example, asking, "What is mathematics and how responsible is mathematics for chronological time?" Such an analysis destabilizes time to be inside and outside of itself at the same time, so to speak. I bring this up because non-linearity has been studied with other discourses in mathematics education, for example, with rhizomatic theorizing and reflection (Kyriakopoulos & Stathopoulou, 2021), ecological dynamics (Abrahamson & Sánchez-García, 2016), and enactivist evolutionary theory (Abrahamson, 2021).

Working in non-linear, non-sequential time

> Queer uses of time and space develop, at least in part, in opposition to the institutions of family, heterosexuality, and reproduction. They also develop according to other logics of location, movement, and identification. If we try to think about queerness as an outcome of strange temporalities, imaginative life schedules, and eccentric economic practices, we detach queerness from sexual identity and come closer to understanding Foucault's comment in "Friendship as a Way of Life" that "homosexuality threatens people as a 'way of life' rather than as a way of having sex" (Halberstam, 2005, p. 310).

Can we declare mathematics as oppositional? Surely its history is interwoven with power and authority. My argument here is that mathematics, queerly practiced, is in opposition to those institutions of rationality and authority so well-critiqued in the literature (by, *e.g.,* Appelbaum, 1995, 2008; Amit & Fried, 2005; Davis & Hersh, 1981; Fasheh, 1983; Walkerdine, 1988). Indeed, this may be the very point that those authors are making themselves, without a nod to queer theory, which emerged well after their publications. Queer mathematics blossoms in opposition to standardized, authority-laced core curricula, scope and sequence charts, accountability, and educational performance as compliance. It emerges as creative, aesthetic and entrepreneurial innovation at any age, grade, or stage of development, and often includes concepts the canon saves for later in life, questions present in the null curriculum (*i.e.,* ignored), or ordinarily categorized as outside of mathematics qua mathematics, such as infinity paradoxes, open-ended investigations with no answer or no obvious application in everyday life, the design of buildings with alternative purposes, or the use of data to question social policy. In this manner, queer mathematics feels as if it is threatening the established order of the official curriculum, focusing on conceptual understanding and the posing of original questions instead of mastery of skills detached from context and purpose. It threatens to unleash mathematically literate students eager to make social and economic changes. 'Queer mathematics' is not 'new', emerging recently with queer theory. It is only now that we can name what has always existed throughout the history of mathematics and mathematics education, given our current rhetoric and ideological context. Just as queer ways of living and being in the world were not named as such until the last century, yet of course were present in cultures around the world, queer mathematics practices have been important aspects of mathematics in general, only now named in this way.

> In his memoir of his lover's death from AIDS, poet Mark Doty writes: "All my life I've lived with a future which constantly diminishes but never vanishes" […] The constantly diminishing future creates a new emphasis on the here, the present, the now, and while the threat of no future hovers overhead like a storm cloud, the urgency of being also expands the potential of the moment and […] squeezes new possibilities out of the time at hand. […] Queer time, as it flashes into view in the heart of a crisis, exploits the potential of […] the transient, the fleeting, the contingent. (Halberstam, 2005, p. 2)

Queer mathematics (education) is emerging from the ruins of school reform, the detritus of No Child Left Behind, charter schools, deskilling of teachers, increased class-based inequities in school funding, the kidnapping of education as a new source of markets and the consequent support of the school-to-prison pipeline, the new Jim Crow, and the stranglehold of standardization on educational innovation. These epidemics have left school mathematics a skeleton of its living self, lacquered with mindless pabulum and universal dislike. What is the future of mathematics for a young person in today's classrooms? A dwindling wasteland of useless, outmoded skills now performed with greater agility and functionality by hand-held devices and invisible servers.

Lost to these epidemics is a mathematics education that exists both inside and outside of the lesson plan structure—a curriculum that takes advantage of the everyday life of the classroom to apprentice our youth into practices of time, space, quantification, shapes, patterns, and new forms of data analysis and representation. The queer time mathematics coming to life in these encounters would be characterized by its non-normativity, taking form through ongoing, long-term sporadic reiterations over the course of days or months, revisiting earlier activities with new identities that are fluid and changing. Gone are conversations about strategy and meaning, in favor of the quick-fix profits of correct answers to formulaic triggers.

Consider three different versions of working as a mathematician: from Georg Pólya (1945), John Mason, Leone Burton and Kaye Stacey (1982), and Stephen Brown and Marion Walter (1983). Polya promoted a linear sequence of 'understand your problem', 'plan what you will do', 'carry out your plan', and 'look back'. It sounds linear when stated in a sequence. Yet, a more nuanced understanding of the practices involved makes it clear that one can only ask oneself the questions that are meant to provoke an understanding of the problem by imagining plans that could be carried out. One can only plan what one will do by imagining if it is possible to carry out that plan. One can only look back by re-visiting what one did with a sense that it could have gone a different way. One cannot actually solve one's problem without a problem already being posed, which is at the end of the sequence—or isn't it? After all, asking oneself what new questions one has after considering the meaning of one's answer is nothing more than the start of the sequence in the first place. In other words, one can only progress through the linear time sequence by hopping back and forth in time. And this can only be done in grasping at the transient, fleeting, glimpses of what might be. 'Inviting in' makes the processes of experiencing a problem in the first place—being called to an unanswered question, not having tools readily at hand, wanting to know more—as important as the work answers, questions, and methods (Xenofontos & Andrews, 2014).

Mason, Burton and Stacey suggested a back and forth progression of specializing and generalizing that leads to a testable conjecture, so that, with more specializing, special new cases enable further generalizations, first for oneself, and then for a skeptical audience. One places oneself into the future, needing to be convinced, in order to proceed in the first place. One imagines a self, now back at the beginning, needing to be introduced to the significance and explanation of one's conjecture, in order to turn a conjecture into a convincing argument.

Problem posing, according to Brown and Walter, usually emerges from asking 'what-if-not' about the attributes of questions already asked. This in itself is queering the process of mathematizing: start with changing what one is doing. Rethinking the conventional sequence of first, learning factual and procedural knowledge, only later to apply skills and facts to the solution of previously-answered practice questions, problem posing offers the exciting idea that doing *anything but* solving problems could lead to even greater abilities to solve complex problems anyway, perhaps even those still unsolved: pose the questions, categorize the questions into types, change the questions into different ones, and so on. Step outside of the timed sequence in order to see the possibilities with entirely new categories and classifications.

In other words, despite the efforts of conventional mathematics instruction to turn mathematics through textbooks of daily lessons into a series of tedious and mindless exercises, mathematics as practiced by mathematicians coexists in a world of non-linear, unconventional challenges to that very standardization. Opting out of the linear time of school curricula, students apprenticed in the arts and techniques of mathematics would focus, not on the eventual answers to be produced, but on the immediacy of the experiences that involve the moment of mathematizing things, of inventing new ways to find connections, ask questions, share ideas with others—in their experiences of living mathematically. For me, the question is not, "What is the model of time that I should use when I a teaching?" but instead, "How can I avoid imposing a particular model of time on my students?"

Embracing the queerness of mathematics

In the language of queer theory, it turns out that common sense school mathematics is very good at what Halberstam refers to as 'reproductive temporality'. We produce a perpetual need to teach people mathematics, even very simple and otherwise easy-to-understand mathematics that the very young and the inexperienced learn quickly when they need to at later times in life. The learning is a kind of demand to learn skills and concepts currently irrelevant but possibly learned again in a meaningful way years later. This sort of mathematics curriculum requires a strange splitting in the learner; they are forced to imagine themselves in another future time and place, actively thankful that they once were subjected to this curriculum. There is a never-ending, perpetual cycle of people processed by mathematics education into those who teach and use it, and those who do not. There has been a long period of stability in both the curriculum and in the general dislike of school mathematics. Where is the ludic quality of an Erik Demaine, of a Vi Hart? Hidden in the offices of academic mathematicians, who travel to conferences in order to play mathematics with each other. School practices that similarly encourage these aspects of 'being mathematical' help learners to find satisfaction, comfort, challenge, and adventure in the particularly queer and non-linear, out-of-sequence, ways of being a mathematician. The point is not to train mathematicians, but to live in a world where all humans *are* mathematicians in their own way, just as all humans are *queer* in their own way.

The development of a non-linear perspective on mathematics education chronology can dramatically transform the ways in which teachers and curriculum developers conceive of their profession, and thus revolutionize the ways in which learners experience learning and discovery in mathematics. Recognizing the characteristics of mathematics and mathematics learning shared with the norm-shattering nature of queer identities and queer time helps us appreciate how to wield these characteristics in the development of curricula, in the design of learning experiences, and in the professional training of future teachers.

One significant application of queer time is in the questioning of a future-oriented present, echoing Halberstam's reference to Doty above. If queer time was one product of a loss of optimism about a future, with a focus on the close reading of the present as rich and full of promise, then perhaps we can make an analogous shift in the remarkably future-focused step-by-step building of the traditional mathematics curriculum toward a future of supposedly more advanced complexifications of the 'elementary' mathematics of early grades. Why do I need to learn this? For next year, for high school, for college. Perhaps you will use this in life—not now, which is in some way *not yet,* but in that mystical, nostalgic future that never materializes. What if we replaced the future building enterprise of the canonical mathematics curriculum with the close reading practices of a present-ist queer time (Pratt, 2011)? What if, like many teachers and future teachers with whom I work, we were simply trying our best to make the present activity in our classroom alive with engagement and generativity? Queer time might help here, as well, in re-orienting us to the 'now'.

> Queer theory's literary-critical origins render it unfit for the anticipatory project of an optimism of the future and the necessary work of planning for that future, but those very same origins have allowed it to recognize reading as the predicate to a future other than now. (Pratt, 2011, p. 184)

Indeed, as Pratt notes, an optimism in the future hides a more perilous faith in the current world as the best of all possible worlds, thereby rendering social change unnecessary: this conservative artifice is challenged by a close reading of the now. What is more bewildering, however, is how such an optimism in the future misconstrues the very nature of time. Chronology, Pratt suggests, is:

> most accurate when it obeys the unpredictable tempo—the situational and erratic pulse—of material experience [...] Clocks, watches, and calendars, in this sense, fail to bring order to or provide significance for that over which they claim dominion [...] they occlude rather than fertilize the horizontal spreading of the present. (p. 192)

A radical use of queer presentness would focus on the ultimate mathematical act: making a decision or choice of what to think about and how to proceed. Radical immersion in the present is achieved through an act of will and collaboration. School mathematics interpolates the individual as here, now, riding along with the events to which one is subjected, that is, to flow with life in the moment and to take what is presented as what one must and should think about. Yet, in the process, one does not ride in a straight line for an easy ride, but instead must somehow use one's wiles to choose, at the crossroads, where to go, how fast, and with what goals in mind: Addition? Angles? Transform this? Collect and analyze data? Perhaps we collaborate with others? This is what queer theorists (Hall, 1999; Santinele Martino, 2017) describe as the experience and ultimately political motif of the 'crossroads'. Taking the pulse of what is, rather than what might be? Perhaps. This could be the optimism of the present. Although it makes impossible the mathematician, who hopes to generate a coming-to-know, it also creates a generative commitment to the present, a new world of knowing legible and intelligible to us as a possibility in-the-now.

Some recommendations that emerge from this way of thinking include:

- *Avoid a future-oriented present*

  This involves resistance to justifying the content being learned with stories of future applications. We can orient activities toward what the students are thinking about now, and encourage them to ask, "What mathematical questions do I have right now? What mathematical investigations spark my curiosity? How can I recognize the mathematical questions I even have?"

- *Question the Given*

  School mathematics interpolates the individual as accepting pedagogical events to which one is subjected, that is, to flow with life in the moment and to take what is presented as what one must and should think about. Spectacular failure to participate in expected activity in anticipated ways has been celebrated in queer theory (Halberstam, 2011). Learners need not wait years to encounter innovation or surprising approaches to mathematics. We can create a culture that celebrates surprising ideas and techniques at a young age that would both highlight the queer aspects of mathematics and enable the experiences of wonder and joy that accompany such ludic moments.

New/old directions for practice

Unraveling the intertwined relationships among mathematics and the plentitude of queer experiences might establish new directions for our practice. Taking this on also creates its own set of new questions for how we theorize our work, and the ethics of our actions. A reviewer of the initial version of this essay asked if LGBTQIA+ people get lost in this apparent embrace and elevation of an essential human queerness, and asked if LGBTQIA+ people could or would have unique roles, responsibilities, and burdens in this reframing of mathematics and mathematics education. My response is to note that this very essay is an example of a role and a burden. Theorized, composed, submitted, and revised through thoughtful reactions from reviewers and the editorial team of the journal, this essay, the product of a queer mathematics educator, could be labeled 'only possible because of the author's identity and life experiences', signifying the burden of queer scholars to introduce these ideas into the conversation, and to articulate their universality. To bring this back into mathematical thinking, in the spirit of Mason and his colleagues (1982), the 'special cases' of queer experience generalize to a conjecture that queer time is not unique to queer experiences, and can be applied expansively. The gesture is similar to the model of the gender unicorn [3] that deconstructs binaries of gender and sexuality into coexisting and fluid levels of identity affiliation, gender expression, juxtaposition of self and birth assigned sex categories, forms of physical attraction, and forms of emotional attraction. Mathematical identities, expressions, attractions, and so on are parallel in their own mathematician unicorn, fluid and fluctuating and taking on different combinations in the moment, 'all of the time'.

As the mathematician unicorn becomes a basis for thinking of ourselves as teachers, researchers, learners, and curriculum designers, mathematics of linear time, and so on as I have described it, as a caricature of mathematics, presumably in contrast to a more authentic queer mathematics, might feel more like coexisting and competing discourses of mathematics. In this way, the linear time and queer time pluralities of mathematics and mathematics education would not have relatively greater authenticity for one or another of us. Presenting a neat and tidy 'use queer time to make mathematics education a utopian dream' slogan is simplistic and too optimistic, both in terms of what is possible for mathematics education and for queerness. Indeed, the current waves of anti-LGBTQIA+, especially anti-trans views in public and political discourses sprouting globally do not bode well for a groundswell of 'queer-time mathematics'. Honest and public commitments to 'queer mathematics' is far too loaded for the current social, cultural, and political milieu. Yet, as I have attempted to indicate, the ideas of queer time have always been present in vital forms of mathematizing, and in the construction of mathematical identities. This in itself is generalizable. Rather than figure out what model of time is best, queer time asks us to create learning environments where any model of time could potentially be the one that best fits, ideally, all of the time.

Notes

[1] Online at http://erikdemaine.org.
[2] Online at https://www.youtube.com/Vihart
[3] TSER (Trans Student Educational Resources) Gender unicorn. Online at https://transstudent.org/gender/.

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