(*Trans-Multi*)*Culturally Responsive Mathematics: (Re)Creating Spaces for Loving Kindness*

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Abstract:
In this paper, I relive my experiences of (un)learning, (re)learning and (re)searching mathematics in multiple cultural contexts. I begin by recounting the moments of dilemma that many students encounter in various cultural contexts, which inspired me to weave the threads of (trans-multi)culturally responsive mathematics. I share this story through the narratives, poems and digital postcards that I created in my auto-ethnographical life writing of engaging in (re)learning of and with(in) mathematics. Underlying these efforts and actions is the hope that sharing these may help in creating spaces for inviting (trans-multi)culturally responsive mathematics in contemporary diversity-rich classrooms. Informed by critical and transformational multicultural education perspectives and the insights of key curriculum scholars—Aoki, Pinar, Schwab, Leggo and Noddings—a (trans-multi)culturally responsive mathematics is a calling for teachers to acknowledge mathematics as a human endeavour. It is an initiation to invite students' lived experiences and multiple ways of knowing in mathematics classrooms with relational caring and loving kindness. Aiming to educate diverse students in a socially and ecologically just manner, a (trans-multi)culturally responsive mathematics urges teachers to embrace wholistic teaching that not only focuses on the mind and body, but also strives for educating the heart and spirit. Thus, it is an ethical, intellectual, political and relational inquiry, which critically engages students with mathematics to discover what knowledge is most worth within and beyond the boundaries of classroom(s) and, thereby, empowers them to co-create mathematics that is living.

Keywords: culturally responsive mathematics; mathematics education; loving kindness

Les mathématiques adaptées aux facteurs (trans-multi)culturels : (re)créer des espaces de bienveillance

Résumé :
Dans cet article, je revis mes expériences relatives au fait de (dés)apprendre, de (ré)apprendre et de (re)chercher les mathématiques dans de multiples contextes culturels. Je commence par relater les moments de dilemmes que rencontrent de nombreux élèves dans des contextes culturels variés qui m'ont poussé à me pencher sur les mathématiques adaptées aux facteurs (trans-multi)culturels. Je partage cette histoire à travers les récits, les poèmes, les cartes postales numériques que j'ai créés dans le cadre de l'écriture ethnographique de ma vie en m'engageant dans la (ré)appropriation des mathématiques. Ces efforts et ces actions sont sous-tendus par l'espoir que mon partage puisse aider à créer des espaces pour inviter les mathématiques adaptées aux facteurs (trans-multi)culturels dans les salles de classe contemporaines riches en diversités. S'appuyant sur des perspectives de l'éducation multiculturelle critique et transformatrice et les idées des principaux spécialistes du curriculum—Aoki, Pinar, Schwab, Leggo and Noddings—les mathématiques adaptées aux pratiques (trans-multi)culturelles invitent les enseignants à reconnaître les mathématiques comme une activité humaine. Il s'agit d'une invitation à tenir compte des expériences vécues par les élèves et de leurs multiples modes de connaissance dans les classes de mathématiques, avec une attention relationnelle et de la bienveillance. Dans le but d'éduquer des élèves diversifiés d'une manière socialement et écologiquement juste, les mathématiques (trans-multi)culturelles incitent les enseignants à adopter un enseignement holistique qui ne se concentre pas seulement sur l'esprit et le corps, mais s'efforce également d'éduquer le cœur et l'esprit. Il s'agit donc d'une enquête éthique, intellectuelle, politique et relationnelle, qui engage de manière critique les élèves avec les mathématiques pour découvrir quelles connaissances ont le plus de valeur à l'intérieur et à l'extérieur des limites des salles de classes, et qui leur donne ainsi les moyens de co-créer des mathématiques vivantes.

Mots clés : mathématiques culturellement adaptées; enseignement des mathématiques; bienveillance

Absence of Love: A Painful Path of (Mis)education

I begin this paper by recounting one of the "dohas", the poetic couplets that were written in the Hindi language by Kabir Das.[1]

Pothi padh padh jag mua, pandit bhaya na koi
Dhai aakhar prem ka, pade so pandit hoye!

Translated into English, this couplet states that

> By reading "pothi" (thick books), no one became a "pandit" (wise).
> Wiser are the ones who are able to read the two and a half letters of "prem"—the love![2]

Indeed, the essence of education is love. The need to love and be loved is one of the most basic human needs (Baumeister & Leary, 1995). However, despite many reform movements that emphasize equitable and responsive mathematics for all students, traditional practices that present and teach mathematics as a factual, acultural knowledge remain prevalent in many classrooms around the globe (Abdulrahim & Orosco, 2020; Raisinghani, 2016a). Muted by the standardized norms of competition, many culturally diverse students' voices often remain unspoken in these contemporary classrooms, which continue to promote and perpetuate Westernized knowledges and Euro-Canadian teaching practices at the cost of Other(ed) cultural ways of knowing (Egbo, 2009).

Moreover, recognized as the "gatekeeper", mathematics still serves as a subject that determines the "status and power" (Nolan, 2009, p. 208) and the fate of an individual in a society (Gutstein, 2007). The pressure to do well in mathematics (and science) comes from all aspects of the society. Often, it is the students' level of performance in these subjects that serves as the key determinant of their acceptance and worth in their families and in society as a whole. As a learner, teacher and teacher educator, I have myself witnessed such cases in multiple cultural contexts, which include Canada, India and Micronesia (Raisinghani, 2016a, 2018a, 2018b).

In this paper, I share my storied experiences of (un)learning and (re)learning mathematics through reflecting on my past and present lived experiences. One may characterize such an approach to writing as life writing because individuals' stories are at the core of all approaches to life writing. However, I am hesitant to characterize this writing into any neat category. Approaches to life writing are necessarily messy as they "tend to be genre blurring and tear down disciplinary walls" (Mulvihill & Swaminathan, 2017, p. 15). Nonetheless, I see it closest to a critical auto-ethnographic life writing project. Referring to the process and what is produced from the process, auto-ethnography as an autobiographical genre of writing and research displays multiple layers of critical consciousness that allows one to understand a way of life through personal narrative, and its relationship to culture within and beyond temporal socio-political contexts (Reed-Danahay, 2009).

[1] Kabir Das was a 15th century mystic poet and saint from India. He is known for his genuine lessons of humanity, morality and spirituality, which he delivered in the form of dohas, the poetic couplets.
[2] "Prem", the Hindi word for love, is written as comprising of two and a half letters of the Hindi alphabet.

Auto-ethnographic Encounters

Ellis (2004) contends auto-ethnography to be more than art and science: It is a form of ethnography that "overlaps art and science, it is part *auto* or self and part *ethno* or culture . . . something different from both of them, greater than its parts" (pp. 31-32, original emphasis). Hence, auto-ethnography is an eclectic, wholistic exploration—it is a form of "research, writing, story, and method that connects the autobiographical and personal to the cultural, social, and political" (p. xix). It creates opportunities to understand an experience one has lived by connecting one's personal life, thoughts and feelings through "systematic sociological inspection" and "emotional recall" (Ellis & Bochner, 2000, p. 737). Therefore, by inquiring into my own lived experiences of engaging with mathematics in multiple cultural contexts, I have attempted to question the dominant modes of representation and power that are embedded in teaching and learning of mathematics and how these may affect students' identity and subjectivity.

As Mulvihill and Swaminathan (2017) mention, a critical auto-ethnographic approach confronts prevailing assumptions and works toward developing more nuanced understandings. I suggest a (trans-multi)culturally responsive education framework as one way that could help in dismantling systemic inequities, and cultivate socially and ecologically just, inclusive mathematics practices that are responsive to the needs of diverse students. I hope that a (trans-multi)culturally responsive educational discourse will bring loving kindness (Khan & Armstrong, 2019) and relational care (Noddings, 2012) in mathematics classrooms. Loving kindness will encourage teachers to create communal places of learning mathematics by relating with all students in a deeper and humane manner and treating them with dignity and grace regardless of their academic accomplishments (Duval, 2018; Su, 2013). Embracing relational care stresses treating others as they would like to be treated and necessitates learning about cultural modes of thinking and acting, and understanding people in context (Gay, 2010b; Noddings, 2012). This in turn will encourage teachers to critically understand their own Selves and thus, Other(s), because "with understanding yourself comes understanding [of] Other/s" (Ellis, 2004, p. xviii).

I consider that such understandings that involve "rewriting the self and the social" through auto-ethnographic life writing have become more crucial now because rapid socio-cultural changes, transculturalization, globalized cultural displacement and exile continue to complicate and break down "the dualisms of identity and insider/outsider status" (Reed-Danahay, 1997, p. 4). These complexities demand us to acknowledge that multiculturalism is a normal human experience (Goodenough, 1976). Each one of us holds a multiplicity of identities as a "[trans-] multicultural human being" (Erickson, 2010, p. 37) because one's constructions of cultural identity may include age, socio-economic class, sexuality, dis/abilities, nationalities, re(li)gion, as well as racial, ethnic, gender(ed) and other identities that continually evolve as one socializes into particular socio-cultural-political contexts. These complexities of living life as a (trans-multi)culturally responsive human being invite us to (re)think how we could make meaning and write authentically our (hi)stories of such a "nonsynchronous Self" (Pinar, 1993, p. 67). And while doing so, we are also invited to (re)think how we could engage in both (re)telling the story and using that story with Other(s) to understand and

use difference productively to develop critical understandings of cultural diversity. Developing such understandings is more crucial in mathematics classrooms because as D'Ambrosio (1986) mentions: "Cultural diversity is so complex, it is a mesh of attitudes and behaviours which have not been sufficiently understood in education, and especially in mathematics education" (p. 5).

Since life writing can be a way to understand the construction of one's Self, I have tried to interrogate the spaces where mathematics is taught in order to raise critical consciousness about how these spaces could be transformed into (trans-multi)culturally responsive curricular places that may positively inform students' cultural and mathematical identities (Anthony & Walshaw, 2009). Considering the centrality of stories in our lives and the dangers of a single story (Adichie, 2009), in this auto-ethnographic life writing, I have endeavoured to take multiple narratives into account to illustrate the multiplicity of voices that these stories may represent. In the next section, I share some of these stories that have compelled me to write this auto-ethnographic writing of life.

Circumscribed Learning of Mathematics

Why do the experiences of learning mathematics often culminate in "performing" in many contemporary classrooms? This question arose for me as I struggled to console my younger daughter, who is studying in a Canadian public elementary school. It was just last week when she came home from school a bit upset.[3] Upon inquiring, my daughter shared that while taking her math quiz she cried because she felt left behind in her sixth-grade classroom.[4] She was nervous about losing points and being looked down at by her classmates, most of whom were done with their quiz much earlier than her.

It was only yesterday that my older sister called and shared her worry about her daughter's health and well-being. My sister told me that she needed to persuade her daughter to take a break from "study" and eat food.[5] For a whole month, my sister's 15-year-old daughter, a 10th grade student in India, has closed herself in her room to "do math" from morning till night so that she might meet the school's set benchmark of 88% on the standardized paper-and-pencil test and secure her seat in her school's elite PCM (Physics, Chemistry and Math) group as an 11th grade student.[6] If she is unable to do so, she will lose her chance to pursue her career in engineering, the desired chosen area of study that will ostensibly secure her an affluent future and status in society.

The dilemma faced by my daughter and niece is similar to the agony of many others in India, who feel trapped in their socially imposed identity, such as that of a cultured daughter-in-law, whose every single action is being watched and constantly judged to determine her "suitability" for the

[3] The time frame mentioned here refers to mid-February in 2019.
[4] Math, the commonly used abbreviated version of mathematics, is used to maintain the flow and to represent how mathematics is referred to, in informal everyday communication.
[5] The quotation marks around "study" indicate the superficial nature of learning that is merely focused on preparing for the tests.
[6] The quotation marks here indicate the usual practices that are promoted to "do math" in schools in India. Focused on passing the tests, such practices merely emphasize rote memorization of mathematical formulas, and practice and drill of specific mathematics problems.

family.[7] How curtailed and trapped one may feel in such a prescribed, calculated mode of life is well expressed in a poem written by my childhood friend Abhilasha Bhatnagar, which I have translated as follows:[8]

I live in a circle

I live in a circle. . .

In a round circular home

Where there are no corners

The diameter is equal

Equivalent is the radius from each side

Equal is the sharpness of all piercing eyes

Equal is the frequency of penetrating voices

I walk on the circumference

Hoping an end will come soon. . .

But does any circle ever have an ending?

Monotonous circular path. . .

Will it ever have the diversity of angles, triangles, rectangles?

The angles that open up a possibility of deviation. . .

The angles that could become sheltered spaces for wiping moist crying eyes

Only the ones who have lived in a circle will cherish the value of such angles

I live in a circle . . . (written on March 2, 2005; translated on March 12, 2019).

Indeed, watched for the correctness of their every single move, many culturally diverse students are tired of running the course of "culture-free" (Bishop, 1994, p. 16) mathematics within the standardized perimeters of prescribed curriculum. In spite of many educational reforms, mathematics continues to remain as the "the worst curricular villain . . . that not only filters students out of careers, but frequently out of school itself" (Ezeife, 2003, p. 180). Math anxiety, a fear or

[7] Despite the growing number of women who are educated and working in India, the traditional societal expectations of Indian daughters-in-law have remained oppressive and unchanged, causing Indian women to be the most stressed women in the world (Goyal, 2011, June 29). In order to be considered as "cultured", an Indian daughter-in-law must abide the rules that are set by the in-laws and fulfill her gender-based role with no complains. In a typical Indian home, a daughter-in-law is expected to complete all the duties of child rearing and household chores with perfection, and often her social relationships and financial independence are curtailed (Farhat, 2017; Sinha, 2016, July 5).

[8] Abhilasha Bhatnagar is an accomplished writer, a mathematics and science teacher, a mother and a homemaker. She and I studied together from Grade 2 until we completed our Master of Science and Bachelor in Education degrees in India. After more than 25 years, I have recently reconnected with Abhilasha who generously shared her poems and provided permission to include this poem.

apprehension about mathematics, is a pervasive issue (Ramirez et al., 2018). It not only has a negative impact on academic engagements with mathematics, but also affects an individual's well-being. Math anxiety has been reported to result in increased heart rate (Faust, 1992) and a neural activation similar to that experienced during physical pain (Lyons & Beilock, 2012). Moreover, detrimental impacts of math anxiety may persist life-long. It negatively impacts an individual's future math achievements in the classrooms as well as their mathematical performance as adults in daily tasks such as making consumer decisions while shopping (Ramirez et al., 2016; Suri et al., 2013). This may explain why mathematics is often seen "as not something that people actually use, but as a best-forgotten (and often painful) requirement of school" (Ezeife, 2003, p. 180).

Notwithstanding the continued difficulties and anxieties faced by many culturally diverse students, often the teaching practices in schools focus on the "pan-cultural" nature of mathematics, with an underlying assumption that these students experience no cultural conflict or could become easily accustomed to learning Westernized Eurocentric mathematics (Bishop, 1994, p. 15). One recent example of this culture-free conception of mathematics was evident in the perspectives of ten teachers of a large urban city in Canada who admitted that they do not consciously think about integrating any cultural knowledges while teaching mathematics in their diversity-rich K-12 classrooms (Raisinghani, 2018b). Similar to a teacher who justified not using any multicultural resources for teaching mathematics by proclaiming that "Math is math" (Schofield, 2010, p. 275), the teachers in this case considered mathematics as "universal" and as a "content focused" subject (Raisinghani, 2018b, p. 150) and did not think about students' cultural diversity while planning their mathematics lessons. Moreover, their occasional efforts to multiculturalize mathematics seemed limited to including cultural knowledges as "4Ds—dance, dialect, diet and dress" (Raisinghani, 2019, p. 27). Such practices of teaching mathematics warrant attention because a general lack of awareness of mathematics as a value-based, cultural knowledge (Bishop, 1994) may continue to perpetuate decontextualized discourses of mathematics where the connections between mathematical problems and real-life contexts are severed (Wagner, 2002).

Approaches of multicultural education that present culture as an exotic, static artifact (Kirova, 2008) have resulted in violent hostility in many schools (Ghosh & Abdi, 2013). Focusing on mere celebration of culture and assimilation of students of diverse backgrounds into mainstream middle-class white norms, these approaches fail to address systemic inequities as they attempt to close the "achievement gap" (Gutiérrez, 2011, p. 23) by accommodating difference. On the contrary, they perpetuate deficit-based narratives that perceive culturally diverse students as problems to be fixed (Ladson-Billings, 2001). The complexities inherent in culturally diverse students' engagement with mathematics require us to rethink: Why are the math stories of these students filled with unpleasant experiences? How long are we going to continue this forced, fast-paced, calculated learning, which often creates a sense of loss among many students for whom mathematics remains an agonizing "place that provokes such feelings as hate, distaste, fear, anxiety, and isolation" (Kahn & Armstrong, 2019, p. 4)? The challenge lies in developing pedagogical relationships that may allow us to learn from both—the memories of loss and the possibilities of continued learning with(in) mathematics.

Certainly, in order to reach many culturally diverse students to whom school mathematics may seem strange and scary, we need to begin (re)writing the Self and the social in our mathematics classrooms. As teachers and learners of mathematics, we need to begin reflecting on our own unconscious biases about students' cultural diversity, and the nature of mathematics, and question the systemic inequities that might be embedded in the culture of our classrooms and schools and in the mathematics that we teach. To address issues inherent in student diversity, various mathematics education scholars have argued for a more inclusive mathematics (Bishop et al., 2015). Some have focused on culturally responsive mathematics (e.g., Mukhopadhyay et al., 2009; Nelson-Barber et al., 2009; Nicol et al., 2010, 2013), others have emphasized teaching mathematics for social justice and peace (e.g., Abtahi & Wagner, 2016; D'Ambrosio, 2008; Esmonde, 2014; Gutiérrez, 2008, 2011; Gutstein, 2006a, 2006b, 2007, 2010; Wagner, 2002), and for creating spaces for open-ended, contextualized (e.g., Boaler, 1993, 1998, 2006; Noddings, 1994), place-based and place-conscious mathematics (Leonard et al., 2013, Nicol & Krykorka, 2016; Rubel & Nicol, 2020). In the next section, I discuss a (trans-multi)culturally responsive mathematics education framework, which amalgamates and extends these understandings further and offers one way to embrace lived curricula in doing and engaging with mathematics.

(Trans-multi)culturally Responsive Mathematics

Troubling the depoliticized conceptualization of culture that often breeds inequality, a (trans-multi)culturally responsive framework recognizes education as a political activity (Freire, 2000) in which culture plays a central role (Gay, 2010b). Informed by the critical and transformational multicultural education perspectives (Keating, 2007; Nieto, 2000) and Gay's (2010b) notion of culturally responsive teaching, a (trans-multi)culturally responsive education attempts to unravel systemic inequities by examining current practices of schooling (Raisinghani, 2018b, 2019). Inviting teachers as crucial change agents in this process, it urges them to embody (trans-multi)culturally responsive teaching by becoming a multiculturally responsive educator first (Gay, 2003). Informed by the key curricular frameworks of Ted A. Aoki, William Pinar and Joseph Schwab, it provides teachers a (trans-multi)culturally responsive curricular framework that could serve as a platform for moving away from a deficit-based curriculum of scarcity towards a strength-focused curriculum of abundance that could empower students in personal and socio-cultural co-construction of knowledge (Raisinghani, 2016a). It opens up the possibilities of creating a cultural third space that holds multiple hybrid cultural spaces (Bhabha, 1994), where students are empowered for learning of mathematics that bridges the "'cultural distance' of their home mathematical culture from the school mathematical culture" (Bishop, 1994, p. 18).

Drawing upon Bhabha's (1994) perspectives, a (trans-multi)culturally responsive education invites teachers to (re)think and understand "culture's hybridity" (p. 38), which emphasizes that "cultures are never unitary in themselves, nor simply dualistic in the relation of Self to Other" (pp. 35-36). Culture is not a mere sedimentation of a historic past. Culture constructs and is simultaneously co-constructed by the historical, socio-political, temporal constraints in which one lives (Erickson, 2010). Thus, a (trans-multi)culturally responsive education acknowledges that, comprising a range of

knowledge, skills, routine practices, actions, belief systems and meaning-making processes, culture is a dynamic, evolving product of human interaction (Gay, 2010b). Following Pollock (2008), a (trans-multi)culturally responsive education argues for moving away from the "'shallow' analysis of 'culture' in schools" (p. 369), which ignores the inequities embedded in everyday schooling and characterizes students and parents of certain cultural, ethnic, racial, national backgrounds and social class(es) with a deficit-based perspective. It urges a critical analysis of culture, which involves acknowledging the dynamic and fluid nature of culture and examining how the notions of cultural diversity and multiculturalism in particular socio-cultural-political contexts may influence one's interactions with Other(ed) individuals. As well, it urges interrogating one's own unconsciousness biases to identify how the processes of immigration, transnationalism and nationalism may shape one's conceptions of an individual's cultural identity (Satzewich & Wong, 2014).

Hence, considering the multiplicity and interwoven nature of cultural identities and increasing transnational human movement in a contemporary globalized world (Leong & Liu, 2013), a (trans-multi)culturally responsive education demands critical scrutiny of how multicultural education practices are enunciated and utilized to respond to (and not manage) cultural diversity in particular socio-cultural-political contexts. It calls for teachers to not merely tolerate, accept or respect different cultural ways of knowing but create opportunities to critique with solidarity the difference in different perspectives in their classrooms (Nieto, 2000) and to inquire: What role does mathematics play in particular cultural traditions and how might these cultural ways of knowing inform their (un)learning, (un)doing and (re)learning of mathematics as a human activity in an equitable and socially and ecologically just manner? Thus, a (trans-multi)culturally responsive education acknowledges that mathematics is not merely a tool for understanding, interpreting, or changing our world, but it is a way of (re)creating our world as it "constructs our notions of reality, truth, logic, reason, [and] knowledge" (Nolan, 2009, p. 211).

In the field of mathematics education, such understandings could be promoted through critical mathematical literacy (e.g., Frankenstein, 2013; Gutstein, 2006a; Skovsmose, 2011) that could enable all students in redressing inequities by (re)imagining and (re)creating the wor(l)d with mathematics.[9] In contrast to the prescribed school curriculum that may present mathematics as calculated, neutral, unidirectional knowledge that has only one correct answer, this rugged terrain of rhizomatic, (trans-multi)culturally responsive curricula (Raisinghani 2016a), conceives and embodies mathematics as contextualized, open-ended (Boaler, 1993, 1998) human activity (Wagner, 2002) that could give students a chance to get up again after each fall and walk on the mathematical pathways that interest them most. Emerging between the curriculum as planned and curriculum as lived, it is an inspirited curriculum of multiplicity (Aoki, 1993/2005), which legitimatizes students' lived experiences by creating opportunities for mathematical activities that bridge the gap between school

[9] Drawing on Paulo Freire's (2000) critique of knowledge production, the notion of critical mathematics literacy explicitly recognizes that mathematical knowledge itself is political. Frankenstein (2013) outlined four goals that are crucial for developing critical mathematical literacy: 1) understanding the mathematics, 2) understanding the mathematics of political knowledge, 3) understanding the politics of mathematical knowledge, and 4) understanding the politics of knowledge.

mathematics and mathematics rooted in students' home cultures (Bishop, 1985, 1988). Acknowledging mathematics as a political knowledge (Larnell et al., 2016), it invites students to become mathematically literate democratic citizens who are able to critically engage in doing and thinking with(in) mathematics and utilize the power of mathematics for promoting ecological and social justice and world peace (D'Ambrosio, 2008).

Hence, asserting the multiplicity of our cultural identities, a (trans-multi)culturally responsive education discourse invites teachers and students to critically engage with the difference through transcultural dialogues (Keating, 2007). It encourages them to initiate "complicated conversations" (Pinar, 2012), which could allow them to (re)discover the dynamic culturally based mathematics that values rich and multifaceted mathematical ideas of diverse socio-cultural contexts (Ascher, 1991; Bishop, 1994; Selin & D'Ambrosio, 2001) with loving kindness (Duval, 2018; McLennan, 2018).

However, there is a fine line between this theoretical optimism of wishing for loving kindness and the practical reality that diverse students may encounter in contemporary mathematics classrooms. To cross this fine line and turn this optimism into a reality, (trans-multi)culturally responsive mathematics urges teachers to embrace authentic, relational care that stresses treating others as how they would like to be treated by listening and talking with (and not at or about) the students (Noddings, 2012). Motivating teachers to go beyond "aesthetic caring" that is limited to personal humaneness and instructional judiciousness, the loving kindness embodied in a relational (trans-multi)culturally responsive mathematics embraces "authentic caring" that emphasizes fairness, rightness, equality and morality, with a responsiveness of understanding people in context, by deciphering the "culturally encoded" intellectual thought and actions (Gay, 2010b, p. 110). It encourages them to promote receptive attention and empathy to sustain students' senses of belonging and engagement in learning and to cultivate critical cultural consciousness into their classrooms as emphasized in "the method of currere" (Pinar, 1975). Currere as "cultural criticism", calls educators to cultivate "sensibility" to recognize how culture shapes their "own consciousness" (2012, p. 45). It offers them a self-reflective pathway to understand how their beliefs and attitudes regarding culture and students' diversity may lead to unkind actions that could further marginalize already disenfranchised students in their mathematics classrooms (Raisinghani, 2018a; Gershenson et al., 2016).

Research suggests that teachers may hold highly racialized implicit/explicit beliefs regarding students' diversity (Gay, 2010a) and regarding employing culturally responsive pedagogies to teach mathematics in diversity-rich classrooms (Shim, 2013). Therefore, a (trans-multi)culturally responsive mathematics discourse encourages teachers to analyze in what ways cultural identities are perceived and experienced—as transnational or racialized Other(ed) identities in their mathematics classrooms. Drawing upon four "Rs": respect, relevance, reciprocity and responsibility, as emphasized in the Indigenous ways of knowing (Kirkness & Barnhardt, 2001), it invites teachers to think about ways that could mediate critical understandings of culture, cultural differences and embedded structural inequalities within schools and to work towards creating empowering educational experiences for all students.

The next section offers some ways through which I have tried to translate these understandings and share how these may lead to conceptualization and actualization of (trans-multi)culturally responsive mathematics. I have used digital postcards to share these understandings because postcards serve as a mode of communication among people. By connecting mathematics with poetry and visuals, in these postcards, I have attempted to embrace mathematics as a human activity. Through inclusion of open-ended mathematical problems and connecting these with the history, place and contextual conditions of the particular school(s) and students, I have tried to create opportunities to build interdisciplinary connections and engage students with mathematics and community in a creative and authentic way. The impetus to create these postcards as digital postcards came during my own engagement with mathematics education as a doctoral student, and because of the ease with which today's students engage with digital technologies. Also engaging with a digital mode may provide an interactive, multimodal, multidimensional, reflexive approach of literacy (Howard, 2014), which may allow students to more fully engage within schools and out-of-school communal spaces of learning mathematics. The digital mode is helpful in sharing these with various community centres and, thus, in involving wider communities in engaging with mathematics. The digital mode of learning also seems more feasible in our current situation where opportunities for face-to-face communal engagements are limited due to the COVID-19 pandemic.

I anticipate that inviting students to create such postcards, through engaging with mathematics in communal contexts, may offer teachers one way to embody (trans-multi)culturally responsive mathematics. However, as Nolan (2009) shares, teachers often tend to consider "mathematics as a neutral tool" (p. 211) that they may use to bring social justice in their classrooms. I am cautioning that a (trans-multi)culturally responsive mathematics is not a prescribed toolkit, neither is it a conceptual formula that can "fit" into the procedural textbook-based teaching. Initiating a (trans-multi)culturally responsive mathematics discourse in any classroom would require one to invite and engage diverse learners in dynamic, relational processes of seeing, doing and living mathematics, which are embedded in all cultures (D'Ambrosio, 2008).

Embodying (Trans-multi)culturally Responsive Mathematics

Rather than teaching mathematics as a rigid subject matter that is hardened with abstract "value free" academic content (Raisinghani, 2016b, p. 29), an embodied (trans-multi)culturally responsive curricula becomes emergent in communal, critical acts of doing and understanding mathematics. As Pinar (2012) mentions, in such pedagogical moments, "the 'subject matter' becomes a double entendre . . . the media of formation for the human subject" (p. xv), where currere guides educators to remain "committed to their—and their students'—ongoing self-formation through academic study" (p. 45). Currere as a self-reflective inquiry perceives curriculum as "the running of the course" and "provides a strategy for students . . . to study the relationship between academic knowledge and life history" (p. 44). Thus, a (trans-multi)culturally responsive curriculum engages students into processes of self-formation that involve self-understandings and collaborative social reconstruction as they tap into their own lived experiences and diverse cultural ways of knowing mathematics.

Respecting students' subjective understandings and cultural ways of knowing, a strength-focused (trans-multi)culturally responsive mathematics strives to educate their hearts, minds, bodies and spirits in a socially and ecologically just, relational manner as emphasized in the Indigenous ways of knowing (Archibald, 2008). One such example of wholistically educating students is depicted in the first digital postcard, entitled "Mathematics for All!". Rather than imposing culture as an artifact and linking it superfluously with the specific mathematical content, the focus is on inviting students to engage in processes of learning mathematics that is embedded within diverse cultural practices. In this particular case, it is envisioned that the students are engaged in learning with their hearts, minds, bodies and spirits as they are able to see, feel, touch, and understand and co-create mathematics that is emergent and embodied in the communal processes of weaving with an Elder.

The poem included in this postcard, which depicts the communication between an Elder and the student, emphasizes that this dialogic, complicated conversation of (re)learning and understanding cultural ways of knowing mathematics would be successful only when students are actively involved in meaning-making processes. The opportunities for students to select the colour and type of the thread and weave the designs of their choice at their own pace under the assuring guidance of an Elder who is willing to guide and respond to their inquiries with loving kindness, illustrate an inclusive learning environment where students are allowed to undo and weave again. Such a collaborative, communal discourse where processes of making mistakes and relearning are intricately intertwined may empower diverse students in "identifying, embracing, and contributing to mathematics that is part of their lived experiences" (Raisinghani, 2016b, p. 29). The description included (ideally at the backside of the postcard) extends these thoughts further, as illustrated in Figure 1.

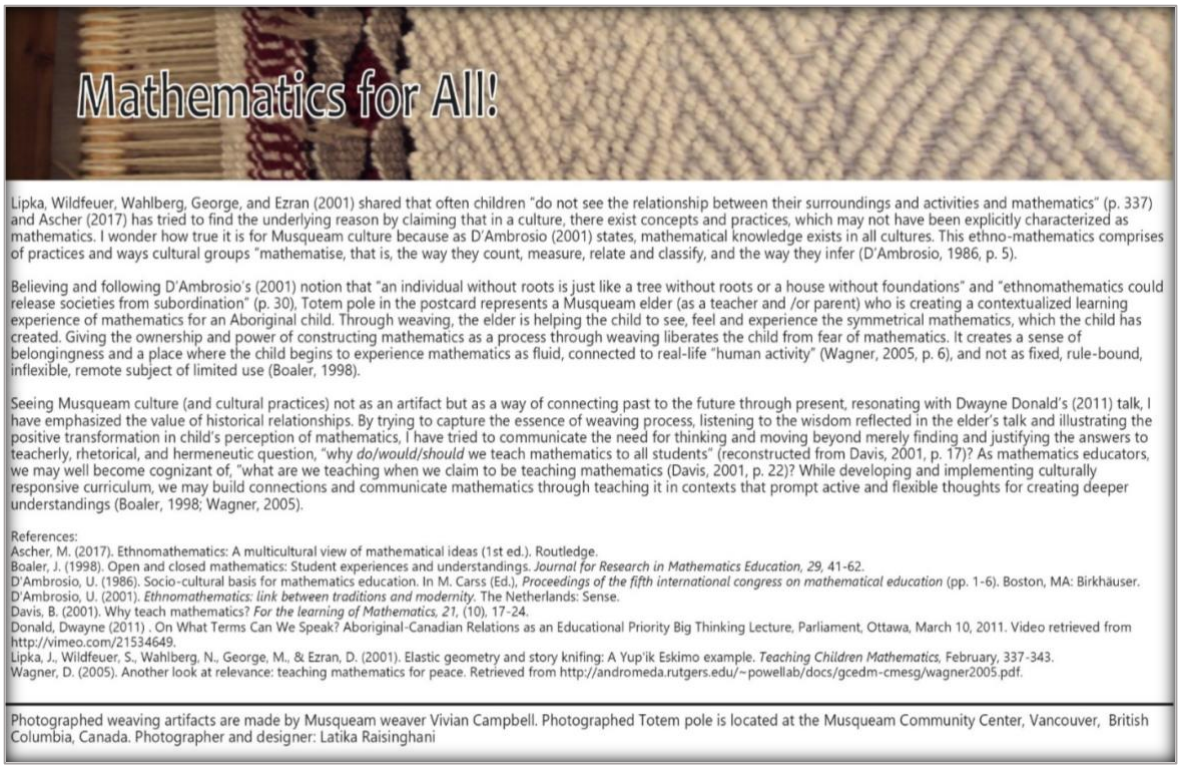


Figure 1. Mathematics for All! Photo by L. Raisinghani.

Involving teacher, learner, subject matter and the milieu as four essential commonplaces that are included in all curriculum making, as informed by Schwab's (1978/1970) "five experiences", a (trans-multi)culturally responsive mathematics engages students in a thoughtful deliberative inquiry to (re)discover questions such as the following: What prior knowledges, skills and abilities do they have? What does it mean to build their mathematical knowledges that are informed by their lived experiences? One way to educate students in (re)learning mathematics that is lived is to (re)connect mathematics with the place.

"Place" is often used to describe location and has a stationary, concrete component associated with it. However, the place in its actual sense is dynamic and is constantly formed due to social relationships within the material setting of that place (Cresswell, 2004). As Cresswell mentions, it is the human capability of making connections that can transform an unfamiliar space into a place that may become a "way for understanding the world" (p. 11). Hence, creating a place-conscious mathematics requires the space of learning mathematics to be transformed into a place that is familiar to students' ways of knowing, understanding and living in the world.

A further consideration is that of *land*. How might one incorporate a sense of "love, respect, and admiration for the land" (Knapp, 2005, p. 284), and empower students as critical, competent thinkers and place-consciously aware, responsible mathematical learners who are well-informed contributing citizens within and beyond their own communities? A challenge for mathematics educators lies in (re)creating a dynamic (trans-multi)culturally responsive curricular place that is informed and shaped by the critical, community knowledge of students within the stationary, undifferentiated, unauthored space of classical "dominant" mathematics (Gutstein, 2007, p. 111). This would require a critical engagement and connection-making with the place, and creating more hospitable spaces for the emergence of mathematics that is open-ended, flexible and kind—allowing diverse students to make meaning of their actions of doing and co-constructing mathematics and mathematical understandings with thoughtful, creative inquiry and relational caring and love for the Self and Others within communal settings.

The second digital postcard, entitled "Place-Conscious Mathematics for All!", shares one such attempt to engage students in relational, communal processes of learning mathematics that promote ecocentric understandings of living with(in) the human and more-than-human world (Gruenewald, 2003, 2008). The students of a local elementary school of a large urban city in Canada were invited to engage in place-conscious mathematics through open-ended, mathematical puzzles and a storied poem entitled "The Silent Wish of Frogs", as depicted in Figure 2. Since the particular school was formed on a land that originally inhabited a river, which was now "buried" under their school building, the poem created opportunities for students to establish connections with the history of the place where their school was built and to think critically about the value of the place and of intergenerational learning. The description included in the postcard extends these learnings and provides a summary of what has been learned in these processes of teaching and learning through "place-conscious mathematics for all".

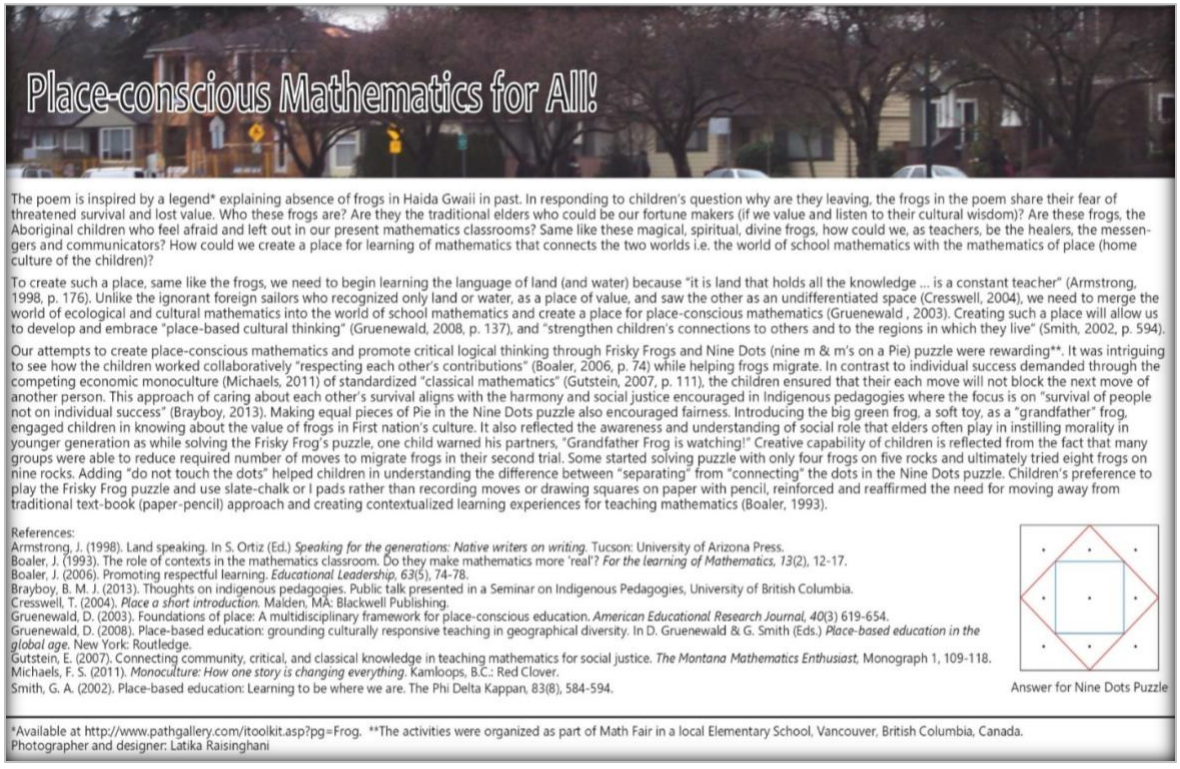
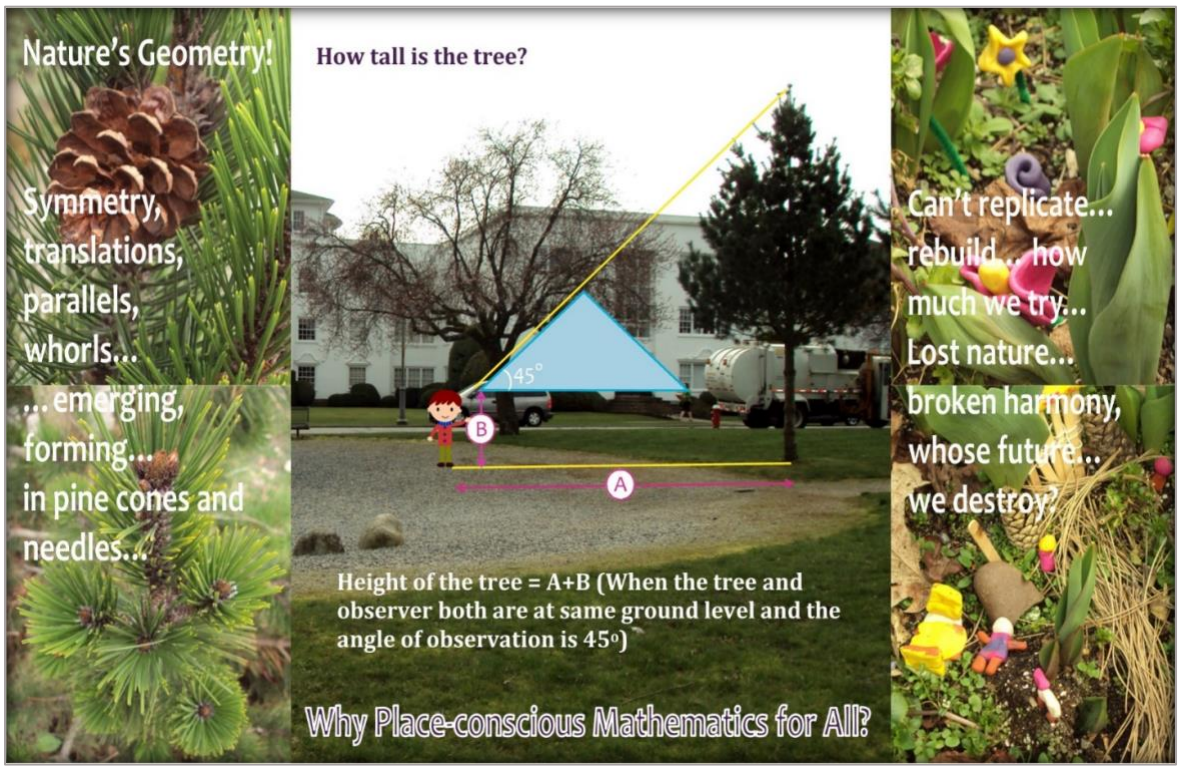


Figure 2. Place-Conscious Mathematics for All! (Photo by L. Raisinghani.)

Why should one attempt to create these place-conscious mathematical narratives that are in the making—the mathematical stories that are authored and co-authored by the students (Armstrong, 2018)? The value of a (trans-multi)culturally responsive place-conscious mathematics education lies in relational understandings that encourage valuing diverse cultural knowledges and learning through these multiple ways of knowing and, thereby, establish "a living dialogical relationship with the world" (Castellano, 2004, p. 104). A (trans-multi)culturally responsive educational discourse invites one to see how mathematics can be productively utilized to promote ecocentric perspective of life and education—education for life's sake (Cajete, 1994). Honoring the ecology of Indigenous education, which builds on the relational accountability and collective value of a "*míyo* ethic"—of "giving back" (Kovach, 2009, p. 149), it encourages students to engage in dialogic, reflexive, spiritual and historic processes of understanding Self-in-relation (to the place and each-other). Acknowledging multiple realities during knowledge co-construction, meaning-making processes of such a subjective (trans-multi)culturally responsive inquiry involve "observation, sensory experience, contextual knowledge, and recognition of patterns" (p. 140).

One such attempt of promoting these contextualized, ecocentric mathematical understandings is shared in the third digital postcard, entitled "Why Place-Conscious Mathematics for All", which emphasizes the value of place-conscious mathematics. Drawing upon an example of a school in a large urban city in Canada, which utilizes outdoor learning experiences as a key pedagogical approach, the learning from nature and critical cross-curricular understandings are emphasized. The poem entitled "Nature's Geometry" invites students to experience mathematics inherent in nature and learn through observing and recognizing the emergent patterns. It also attempts to create a sense of reciprocal responsibility, relational connectedness and respect towards nature, which could be further strengthened by inviting students to adopt a tree, and by engaging them with the community in taking care of school landscape. The problem of measuring the tree height illustrated in the figure introduces a formula, which could be utilized as a starting point to connect school mathematics with the mathematics embedded in cultural ways of knowing by sharing cultural practices of using shadow measurements such as in sun dials and ancient measurements of pyramid heights. These activities can be further extended to promote cross-curricular understandings as described in Figure 3.



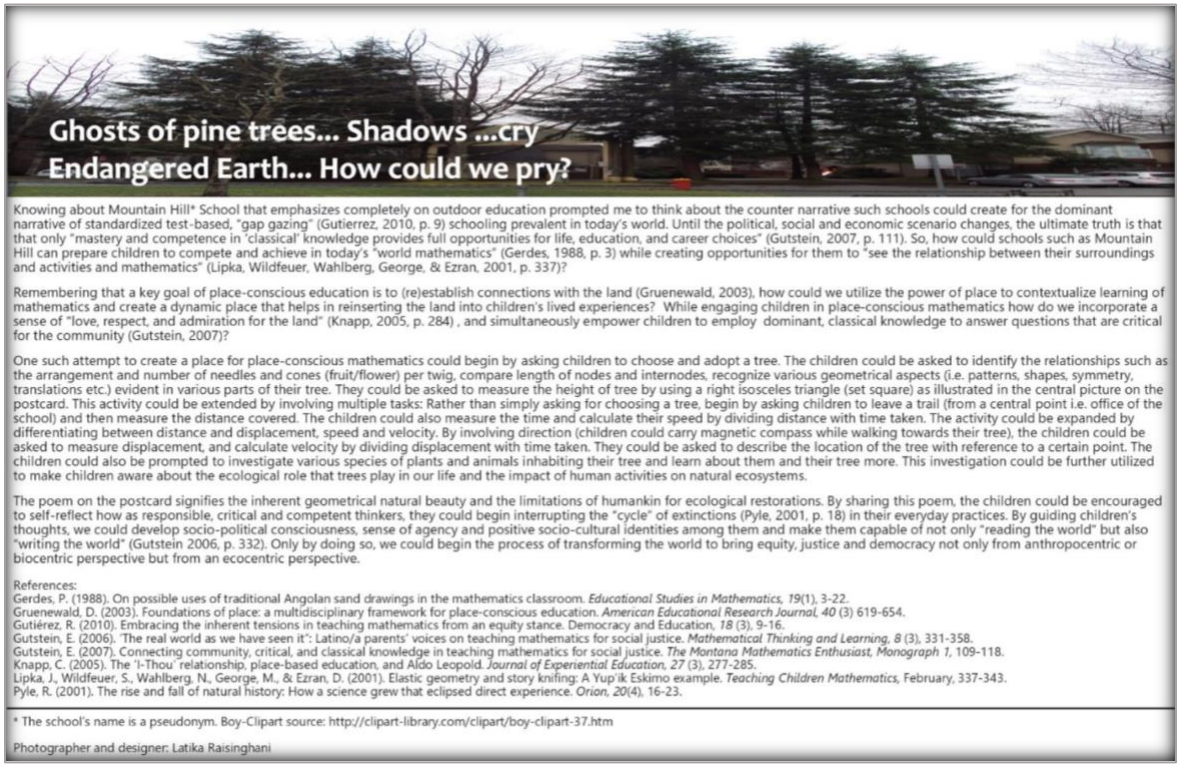


Figure 3. Why Place-Conscious Mathematics for All? (Photo by L. Raisinghani.)

Learning for Love: Lingering-on Lived Curricula

As mentioned previously, the (trans-multi)culturally responsive mathematics that I envision is not a prescribed set of theoretical ideologies, nor a toolbox of instructional approaches, nor a one-size-fits-all curriculum that would ensure teaching for diversity in an inclusive, ecologically and socially just manner with loving kindness and relational care. Rather, it is (re)imagining a way forward that I hope would allow teachers to understand the complexities of issues that underlie and complicate the theory-to-practice translation and transformation of mathematics with(in) the contexts of their own diversity-rich classrooms. A (trans-multi)culturally responsive mathematics is a lived, socio-culturally-economically-politically informed, contextualized manner of reading, questioning, responding and writing the wor(l)d, through multiple ways of knowing that teachers may co-initiate by engaging with their diverse students in transcultural dialogues of (un)learning, (un)doing, (re)searching and (re)imagining mathematics with(in) everyday interactions. It is an instigation for teachers to become self-reflective practitioners and reflexive learners of mathematics who are open to question and critique their own biases about culture and cultural diversity, and their own predispositions of the nature(s) of mathematics, and their intentions of teaching the content and processes of mathematics.

Informed by Pinar's (2012) "allegory—a specific narrative that hints at a more general significance" (p. xiv)—a (trans-multi)culturally responsive mathematics is a calling for teachers to promote an ethical, intellectual and political understanding of the mathematics curriculum that could enable students to inquire, analyze and decide what knowledges are most worth with(in) and beyond the contexts of their mathematics classroom(s). Such an allegory of a (trans-multi)culturally responsive mathematics calls one to linger in-between curriculum as planned and curriculum as lived (Aoki, 1986/2005) and invite multiple ways of knowing in today's diversity-rich mathematics classrooms with relational care (Noddings, 2012). It opens up the possibilities for teaching of mathematics in an ecologically and socially just, relational manner, which allows one to understand that, embedded in all intricate processes of life, mathematics is a culturally based knowledge (Ascher, 1991; Bishop, 1994; Selin & D'Ambrosio, 2001). It creates opportunities for students and teachers to self-consciously weave their socio-politically-historically structured subjective past(s) with(in) their present lived experiences. Hence, following Aoki's call for the lived curriculum, a (trans-multi)culturally responsive mathematics discourse is embodied in life—embodied in the "very stories and languages people speak and live" (1993/2005, p. 207).

Inspired by Carl Leggo's (2015, November 13) poetic legacy, a (trans-multi)culturally responsive mathematics is an invitation for teachers to "ruminate on a curriculum of character that avoids caricature"—it urges them to learn from their culturally diverse students because "children are the greatest teachers". As Leggo's "curriculum of character", it invites teachers to seek new ways of seeing, knowing, being and becoming, and to bring new spiritual, emotional and ethical understandings that could promote teaching and learning of mathematics while living with wellness in their diversity-rich classrooms.

By listening to the multiplicity of voices of diverse students, as an educator and learner of mathematics, one may (re)discover questions such as these: What is it to be human while engaging in (re)learning, (re)teaching and (re)discovering mathematics? Where and who am I as I begin to write a curriculum of mathematics that would allow me to just *be myself* and *be just* to all my students? As I engage in a dialogical, complicated conversation of co-constructing mathematics with my diverse students, how might I linger-on for embracing loving kindness with(in) each and every moment of teaching and learning mathematics with a relational understanding that we all:

need lessons in love...

because nothing could be as simple as love...

as hard as learning to love...

learning for the love (of mathematics)

learning for life... the living (trans-multi)culturally responsive mathematics!

Concluding Confession

I want to conclude this paper by acknowledging that while I have attempted to share my understandings of (trans-multi)culturally responsive education that could invite lived curricula in mathematics classrooms and have provided some examples of how it might look like, the purpose of sharing these is not to suggest any universally applicable mathematical approach as this would defeat the whole purpose of (trans-multi)culturally responsive education. I have shared these experiences because they have inspired me to take the risk of educating myself and to begin the journey of becoming a (trans-multi)culturally responsive educator and I hope that they will also encourage you to do so. I also want to emphasize that I have merely begun this narrative of (trans-multi)culturally responsive education and it will become complete only when you, the reader, the mathematics educator, the teacher and learner of mathematics, take the next step to embark on this life-long learning journey. My following poem extends this message and includes my internal dialogue with myself and with you, the reader.

Becoming (trans-multi)culturally responsive: What is it?

You may call it a mere conceptual thought...

or understand that becoming (trans-multi)culturally responsive...

is an ideological and pedagogical commitment...

It is a life-long endeavour that you have to traverse...

in your own educational landscapes!

Because...it is only you who can (re)define...

what does being (trans-multi)culturally responsive mean to you and how you may initiate...

a (trans-multi)culturally responsive educational discourse that allows one to transcend...

the divisionary binary boundaries that separate Us as Other(ed) you and me...

and begin a subjective (trans-multi)culturally responsive inquiry...

that initiates transcultural dialogues to (re)discover and (re)create...

dynamic (trans-multi)culturally responsive curricular places in schools and classrooms...

that embrace socially—and ecologically—just pedagogical practices with loving kindness...

that allow complicated conversations to begin (re)emergence of lived mathematics...

that is not only for you or me but for Us...

the (trans-multi)culturally responsive human beings!

Acknowledgements

I dedicate this paper to the loving memories of Dr. Carl Leggo whose legacy of provocative, poetic curricular inquiry will continue to be a guiding source of inspiration for me. All the poems that I wrote as part of this paper are inspired by his poetic legacy. Dr. Leggo was not in my PhD advisory committee, neither he was a faculty member in my immediate department, but he was one of the few professors who generously extended their scholarly advice to guide my educational journey as a beginning scholar in Canada.

I am thankful to Dr. Samson Madera Nashon, my PhD supervisor, and the members of my PhD advisory committee Dr. Hartej Gill and Dr. Stephen Petrina, who believed in my potential and who have continued to guide my path during my learning journey of becoming a (trans-multi)culturally responsive educator. I also extend my thanks to Dr. Cynthia Nicol who introduced me to the field of critical, culturally responsive mathematics education and inspired me to create the digital postcards included in this paper.

The loving insights of my late father, Professor Prem Mangharam Raisinghani, whose first name Prem means love, are the core of my educational soul, which continually motivate me to spread the love of/for/in/with education. My late mother Mrs. Mohini Prem Raisinghani's unconditional love has allowed me to be me, and that is what I aspire for all the students I learn with, all my relations: the potential to believe in and to empower themselves. I strive to initiate and co-cultivate the nurturing (trans-multi)culturally responsive educational environment, which gives students the chance and choice to be who they are and want to be!

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