Negotiations of the Tamil-Canadian Identity in Ontario's K-12 Science Education

by

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Abstract

With Ontario home to the largest Tamil diaspora outside South Asia (Government of Canada, 2023), there exists a federal obligation under the *Canadian Multiculturalism Act* (1985) to support the preservation of Tamil language and culture. Given that Tamil-Canadian youth attend K–12 schools and frequently pursue STEM-related careers, this study investigates how Ontario's science classrooms influence and sustain—or marginalize—their Tamil identities. The central research questions are: (1) What are Tamil-Canadian university students' motivations for pursuing science in K–12 schooling? and (2) How are their identities (re)shaped through their experiences within Ontario's K-12 science education? Grounded in narrative inquiry (Connelly & Clandinin, 1990), the study leverages the author's Tamil-Canadian positionality to co-construct participant narratives, analyzing how youth negotiate their "figured worlds" within the context of school (Holland et al., 1998). Drawing on decolonial thought (Tuck & Yang, 2012) and Critical Race Theory (Crenshaw et al., 1997; Ladson-Billings, 1998), the study critically examines systemic barriers and cultural erasure within science education. Through thematic analysis, the findings reveal that Tamil-Canadians in this study pursue science not out of interest, but as a means of social mobility through credentialism, leading to identity fragmentation. This research is significant in its contribution to the limited scholarship on Tamil-Canadian experiences, particularly within the field of science education.

Keywords: Ontario K-12 science education; Tamil-Canadian; identity negotiation; figured worlds; narrative inquiry

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Dedication

This thesis is dedicated to my parents.

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This work is for both of you—my beginning, my foundation, my why.

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Chapter 1. Is It My Experience or Ours?

Every day, I wake up with an urgency to catch up. The urge stems from an inescapable feeling that something inherently integral to who I am is missing, but for a while, I could not quite put my finger on it. It took reflecting on my positionality to realize that despite calling myself Tamil, I was in fact, deeply emerged in the dominant settler-colonial lifestyle that so illusively glamourizes the "true North, strong and free." Ironically, I was never actually free to go beyond the boundaries of a settler in Canada unless I was ready and willing to face further marginalization than I would already endure on a day-to-day basis.

Is this experience unique? Unfortunately, not. In an age where globalization and migration has become more prevalent and accessible, it is inevitable that individuals find themselves with multiple identities, including one of their ethnocultural ancestral roots and one from their nation of settlement (Simon et al., 2013). Katsiaficas et al. (2011) theorizes individuals' pluriversality as the "hyphenated selves," where meaning making occurs *between* contentious political and cultural contexts. The meaning-making process within hyphenated selves is critical in that it necessitates careful negotiation between preserving one's minority culture while simultaneously taking part in the dominant society they have settled in. However, the "freedom" to negotiate is not always afforded, especially in countries like Canada with historical and ongoing settler-colonial influences that pervasively permeate all societal infrastructures and institutions (Barker, 2009). It is the very nature of settler-colonialism to silence, appropriate, and erase identities that do not fit into its dominant mold in order to mobilize power and reinforce its superiority (Koggel, 2018).

As such, I intentionally neglected my minority Tamil identity as a youth throughout my participation in the Canadian K-12 education system (Balasubramaniam, 2024). Moreso, my

pursuit of science education during my most impressionable years left me desperate to shape myself into the ideal settler-colonial student…just so I could get the perfect grade. The risk of erasing a critical part of me did not offer the reward I sought as I struggled immensely to complete my science degree, let alone excel in it, leaving me consumed with the guilt of not investing more time in learning about myself instead. However, I question whether I should feel burdened with such guilt when larger societal actors and structures are at play and responsible for my assimilation into settler-colonialism. Most importantly, what role did my education have in creating such an inequitable environment that led me to abandon my minority identity? Though I speak from my lived experiences, my observations and engagement with my Tamil community has led me to consider that I am not alone in this tug-of-war battle between home and school cultures.

Therefore, this study aimed to decentre the pervasive settler-colonial narratives and instead, took the opportunity for my Tamil-Canadian communities voice to be heard. By unveiling Tamil-Canadian university students' past experiences of K-12 schooling and identity negotiations, my work aims to disrupt colonial notions of multiculturalism and contribute to an equitable understanding of ethno-culturally and racially marginalized experiences within science education. To that end, the research questions that guide this study are: (1) what are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling; and (2) how are Tamil-Canadian students' identities (re)shaped through their experiences within Ontario's K-12 science education?

1.1 Settler-Colonial Education in Canada

Looking back at the historical context of Canada demonstrates the deployment of Eurocentrism as the ideological fuel for spreading and maintaining settler-colonialism across

what was natively known as Turtle Island. Dei et al. (2022) describe Eurocentric paradigms as rooted in notions of European superiority that mark Europeans as "civilized" and all other entities as not. From this, hierarchical structures are born that place whiteness as the norm, thus establishing Eurocentrism as the dominant, hegemonic, and universal approach to a civilized society. As such, Eurocentric knowledge is categorized as superior and mediates all forms of formal education in Canada (Dei et al., 2022; Guppy & Lyon, 2012).

Implications of a settler-colonial education in Canada can be seen on many levels between curriculum, pedagogy, and assessment. With Eurocentric perspectives permeating the curriculum, other knowledge systems become discredited by means of silencing, appropriation, or erasure (Guppy & Lyon, 2012). Racialized students are then made to feel inferior to their white student counterparts and forced to engage exclusively in Western forms of learning that aim to assimilate them into the settler-colonial culture (Lund & Carr, 2010; Smith, 2012). For instance, the historical narratives taught in Canadian schools oftentimes valorizes whiteness by hiding accounts that would otherwise be indiscriminately oppressive (Kempf, 2006). This includes (but is not limited to) the enslavement of Black people in Canada for over 200 years (Brown, 2008), the atrocities that Indigenous peoples had to endure including during residential schooling and the sixties scoop (Logan, 2014; St. Denis, 2011), and the history of immigrant labour exploitation (Lim, 2006; Sugiman, 2005). Dei et al. (2022) describes this as the "gaslighting of racialized students" (p. 57), where white students are taught that the world revolves around them and racialized students are lucky if they are even acknowledged.

On top of prescribing what is to be taught through a curriculum-as-planned (Aoki, 2024), education is also concerned with the ways in which learning can be facilitated. Pedagogically, Eurocentrism favors lineal ways of learning that associate growth with progressive accumulation

(Collet-Sabe, 2023). This aligns with the settler-colonial, capitalist views of consumption and production, where teachers dispense knowledge, students consume it and attempt to reproduce it to validate acquisition (Collet-Sabe, 2023). Learning, then, becomes a quantitative endeavour to achieve the marks that will allow the student to move onto the next grade, as opposed to focusing on the qualitative process of making sense of what is being learnt. With this outlook, it is not important for educators to ensure that students are learning content relevant to them, but rather they are to learn content that will be tested. An example of a popular linear measurement tool would be standardized testing, a form of assessment that implies equal opportunity for all students but is biased towards Eurocentric knowledge to begin with (Viruru, 2006). In fact, standardized testing oftentimes is used to stream students into either gifted/academic programs, regular "mainstream" programs, or special needs programs (Dei et al., 2022), which acts as a further barrier to upward mobility for systematically marginalized students.

The nature of streaming students is guided by what scholars call the hidden curriculum. The hidden curriculum contributes to the attitudes and practices of educators and is shaped by the norms, assumptions, and values of dominant systems, such as settler-colonialism, which marginalize racialized students (Dei et al., 2022). Teachers and administrators covertly participate in the act of othering by denying the hidden curriculums very existence under notions of "professionalism" (Marom, 2018), allowing for it to continue creeping throughout the classroom without resistance. An example of a normalized assumption employed by educators is the model minority myth. Wang (2008) brought to light the concept of the model minority myth as a "calculated contrast" (p. 24), that deduces the success of the Asian minority population to their non-confrontational, hardworking, and law-abiding nature, in comparison to other minority groups who struggle because of their defiance rather than structural inequalities (Shu, 2024). Not

only does this impose a deficit-based lens on Black and Indigenous students (Gebhard, 2020; Ladson-Billings, 2005), but also forces Asian students to internalize the myth as an "assigned role" (Sensoy & DiAngelo, 2017, p. 68). As such, educators continue to stream East- and South-Asian students in heavily math- and science-based professions with ease as the students find difficulty resisting the narrative (Navaratnam, 2011). For that reason, this study will take a closer look at science education in particular, as it is one of the most common spaces South-Asian students, such as Tamil-Canadians, find themselves in.

1.2 Research Problem and Rationale

Tamil is one of the longest-surviving languages in the world (Stein, 1977). The resiliency of Tamil language speakers both preserved and established its culture, with origins being traced back to Southern India (Ramaswamy, 1993). Today, Tamil, through a combination of language and culture, encompasses an ethnic identity, with many residing in India, Sri Lanka, Malaysia, Myanmar, and Singapore (Asher, 1985). Outside of South Asia, Canada is host to the largest Tamil diaspora with a majority settling in the Greater Toronto Area (Government of Canada, 2023). Such circumstances came to be after Sri Lanka erupted in an ethnic war between Tamil and Sinhalese communities (Aruliah, 1994). To escape the trauma-inducing environment, numerous Sri Lankan Tamils fled their homeland to preserve their well-being, language, and culture. During this time, Canada welcomed Sri Lankan Tamil[1] refugees under a compassionate basis, resulting in the 237,890 Tamil-Canadians we have today (Statistics Canada, 2023).

[1] Indian-Tamils have also immigrated to Canada but not in the same large influx, and more for economic reasons rather than seeking asylum. For that reason, this study will refer to Tamil-Canadians as coming from Sri Lankan Tamil background but also acknowledges the existence of other Tamil nationalities within Canada.

That being said, the grace that Canada offered to Tamils seeking asylum should not have been contained within a one-time effort but instead a continual practice of sustaining the Tamil identity post-immigration. In fact, Canada is federally responsible, under the Canadian Multiculturalism Act (1985), and "committed to a policy of multiculturalism designed to preserve and enhance the multicultural heritage of Canadians while working to achieve the equality of all Canadians in the economic, social, cultural and political life of Canada" (para. 8). Yet very little attention in scholarship is given to understanding what experiences Tamil-Canadians are undergoing, making it difficult to propose constructive ways to sustain their language and culture. Considering all newcomer and subsequent generations of Tamil-Canadian youth attend K-12 schooling, it is important to examine how classrooms, and specifically science classrooms, afford space to acknowledge and sustain their Tamil identity. According to Statistics Canada (2022), one of the most sought out undergraduate fields of study for South-Asian men are in the Sciences, Technology, Engineering, and Mathematics (STEM). Thus, it is necessary to ensure the preparation of students for such studies also includes building a healthy relationship with their minority identity so that they have the required skills to negotiate between various worldviews post-graduation. On the other hand, South-Asian women are widely underrepresented in the same undergraduate STEM programs (Statistics Canada, 2022), indicative of the gender barriers prevalent in the field, but still requires an understanding of the experiences of Tamil students during K-12 schooling that lead to such outcomes.

For that reason, the scope of this research will focus on unveiling the experiences of Tamil-Canadian university students during their time in K-12 schooling, particularly in terms of their affordance around identity negotiations. Additionally, the study will situate itself in

Ontario, where a majority of Tamil-Canadians reside, and within the context of K-12 science education.

1.3 Theoretical Framework

The research investigates how Tamil-Canadians negotiate their identities within the colonial power structures that come into play in Ontario's K-12 science education. As knowledge is a socially constructed product that caters to dominant groups, it carries weight that can implicate minority groups. Thus, to engage in critiquing the power structures that shape constructions of knowledge requires critical theory to "theorize and undo the structures of oppression" (Smith et al., 2022, p. 646). Since critical theory is concerned with various social structures, it can be too general of a lens to use on its own, allowing gaps in understanding to emerge within a research problem (Mulvihill & Swaminathan, 2017; Smith et al., 2022). To avoid this, the various power structures within a problem must be deconstructed.

One aspect of this study looks to disrupt the settler-colonial ideologies within science education, resulting in the need for a decolonial lens to dismantle colonial power structures (Held, 2023; Higgins, 2014). As this study is also concerned with Tamil-Canadians who come from the marginalized South-Asian race within Canada, Critical Race Theory (CRT) will also be used to examine the role of whiteness in racial power structures (Obeyesekere, 2023; Shanmugaraj, 2023; Smith et al., 2021). However, to holistically understand the research problem, the various findings must be brought together. As such, I look towards Ali Meghji's (2020) concept of theoretical synergy between CRT and decolonial thought for this study.

A term coined by Kimberly Crenshaw (1997), CRT examines the systemic barriers upheld by racial inequities that are embedded throughout institutions and within society (Ladson-Billings, 1998). The term "race" has been utilized in a misleading manner due to its construction

around genetic assumptions that associate physical features, like skin colour to "intellectual, moral and cultural superiority or inferiority" (Desai & Subramaniam, 2003, p. 132). Framing race within a non-existent biological reality dismisses the purpose of its social construction, which is to reinforce power imbalances. The resulting racial inequities create barriers such as the unequal distribution of societal resources as well as the manifestation of prejudice and discriminatory-based bias and assumptions on various racial groups (Meghji, 2020). Thus, experiences can vary based on where one falls on the racial hierarchies (combined with the complexities of other intersecting identities) that are established through power, with whiteness as the dominating force (Ladson-Billings, 1998). Important to note, however, is CRT's focus on contemporary racism, as an emphasis on past legacies of racism can take the spotlight away from current benefactors of racial structures (Meghji, 2020).

Nevertheless, a contemporary focus on power structures is not sufficient as this study also focuses on science education, which must be examined through a historical lens to understand the roots of its knowledge production. In Canada, much of its historical context is rooted in settler-colonialism which not only silenced and erased local Indigenous languages and cultures while simultaneously stealing their land and other natural resources, but also attempts to establish universality over all other ways of knowing and being (Held, 2023). As such, McArthur (2022) exclaims that, "we must recognize Indigenous thought and decolonization as a core struggle of this age" (p. 1682). Despite such recognition, a common misunderstanding is to simply replace critical theory with Indigenous or decolonial thought, however, this becomes yet another form of cultural appropriation within the western paradigm. Decolonization is not only a theoretical unraveling of power structures, but also an embodied movement, one that returns land, reverses wealth accumulation, and revitalizes suppressed languages and cultures

(McArthur, 2022). Although the research seeks to sustain Tamil-Canadian identities, there is an understanding that equity work without simultaneously seeking justice for Indigenous communities, is work that continues to silence the root problem of power struggles. Thus, a decolonial thought framework, which examines the colonial relations that ground knowledge systems and then actively delinks from it in place of "pluriversality" (Tuck & Yang, 2012), must be constructively incorporated into the research.

Meghji (2020) pointed out that it is important to not interchange CRT and decolonial thought as synonymous as there is a "methodological difference between historical analysis and presentism" (p. 650). This is where theoretical synergy comes into play to allow a social reality to be studied from different theoretical frameworks in order to understand the full complexity of the phenomena (Meghji, 2020). In addition to CRT and decolonial thought, I bring forth one more theoretical framework introduced by Holland et al. (1998) called "figured worlds." When relying solely critical theory, the study can become entangled in the many power structures at play, shifting focus away from the core of the research: lived experiences of identity. Urrieta (2007) describes the connection between identity and figured worlds as "how [people] come to 'figure' who they are, through the 'worlds' that they participate in" (p. 107), making it a malleable and agentic process rather than culturally deterministic. For that reason, I apply theoretical synergy between CRT and decolonial thought to achieve an overall temporal framework for examining the settler-colonial notions embedded in science education and the present racial structures that act as barriers for Tamil-Canadian students in science classrooms, while also considering the flexibility figured worlds offers to negotiate between identities within the deconstructed power structures of this study.

1.4 Objectives, Research Questions and Significance

As the existing literature either generalized all South-Asians in Canadian education (Navaratnam, 2011; Samra, 2020; Sundar, 2008), or ethno-culturally marginalized identities in science education (Aikenhead, 1996, 2006a; Higgins, 2014; Smith et al., 2022), the purpose of the study was to explore the experiences of identity negotiation by Tamil-Canadians who have completed Ontario's K-12 schooling and are currently pursuing science undergraduate degrees. In this study, negotiated Tamil-Canadian identities are defined as a student's agency to navigate between their figured worlds (Holland et al., 1998), both Tamil and Canadian, within a science learning environment through cultural border crossing (Aikenhead, 1996). Focusing on cultural border crossing was crucial in this study in order to reduce the harms caused by settler-colonial narratives in Canadian science education (including the silencing, appropriation, and erasure of minority languages, beliefs, and cultures [Raisinghani, 2016]) by offering possibilities of multidirectional movement through figured worlds. The research was guided by the following two research questions:

(1) *What are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling?*

(2) *How are Tamil-Canadian students' identities (re)shaped through their experiences within Ontario's K-12 science education?*

The first question aimed to understand the nature of arrival into science education for Tamil-Canadians. In doing so, a temporal framework was employed that traced and linked pockets of experiences beyond the science classroom walls, taking into consideration the pervasiveness of social, cultural, and political structures. The second question re-centred the aim of the research, interrogating the unquestioned knowledge and practices within science

curriculums, pedagogy, and assessment through its implications on the Tamil-Canadian identity. To answer the research questions, three objectives were deployed:

(1) unveil the past lived experiences of Tamil-Canadian students in Ontario's K-12 science classrooms;

(2) unpack the social, cultural, and political structures within the experiences of Tamil-Canadian students in Ontario's K-12 science classrooms; and

(3) capture the experiences of identity negotiation employed by Tamil-Canadian students during their time in Ontario K-12 science classrooms.

As these objectives were concerned with qualitative information rooted in experiential knowledge, a narrative inquiry methodology was engaged with. Narratives evoke a type of storytelling that is rich in details and engulfed in emotional awareness that contextualizes the intangible parts of the human experience (Connelly & Clandinin, 1990; Savin-Baden & Niekerk, 2007). Such nuances are pivotal for exploratory work which aims to gather as much context as possible before deciphering the findings. Narrative inquiry offers the possibility of meeting the unexpected that will transform what we perceive to be "truth" (Atkinson, 2007). Thus, this thesis research did not seek a definitive answer, in fact, the more complex the data was, the closer to the reality of Tamil-Canadian experiences it got.

This research holds significant value in that it adds to the limited but growing body of knowledge and scholarship around Tamils in Canada, specifically within the science education context. By bringing awareness to the experiences of Tamil-Canadians within a Canadian education system, critical steps towards sustaining Tamil-Canadian identities were initiated. For one, the collective narratives of Tamil-Canadians acted as a call for educators to critically think and implement curriculum as a living and evolving document rather than as planned (Aoki,

2024). Additionally, the findings of this research inform decision-making actors, such as school boards, government officials, and policymakers with a critical perspective yet to be shared. Finally, and most importantly, the research is significant through its validation of the Tamil-Canadian experiences with the opportunity to reflect, as a community, of where we are in relation to our future possibilities.

Chapter 2. Mapping the Landscape

This study is concerned with understanding the identity negotiation process of Tamil-Canadian students while simultaneously deconstructing the power structures permeating throughout Ontario science classrooms. Using Google Scholar as the sole database, varying combinations of the following keywords were used to collect background literature: Tamil-Canadian; science education; Ontario K-12 schooling; identity negotiations; anti-oppressive pedagogy. The rationale for using varying combinations of keywords was due to the fact that there was a gap between Tamil-Canadian studies and science education studies which resulted in zero hits. Thus, the removal of either word offered more relevant literature to gather background knowledge on. Additionally, a date range was not applied for the literature search for the reason of gathering historical data on the roots of Canadian science education and long-term experiences of Tamil-Canadians. This literature review was organized thematically, targeting the research questions posed earlier: *What are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling, and how are Tamil-Canadian students' identities (re)shaped through their experiences within Ontario's K-12 science education?* The review begins with the literature that describes the general experiences of Tamil-Canadians before broadening the scope to include work concerning South-Asian Canadian identity formation and negotiation experiences, and finally expanding to the experiences of minority ethnocultural students in science education. In doing so, the literature review captures both a breadth of knowledge across the research topic, but also depth with key concepts that shape the understanding of the findings that will be discussed later in the analysis of the narrative data collected. Despite the lack of relevant Tamil-Canadian literature for this research's specific

science education context, the first section uncovers what knowledge is currently available to help create a starting point in understanding the people who drive the topic of the study.

2.1 Canada's Tamil Diaspora

Outside of South-Asian countries, Canada is host to the largest Tamil diaspora (Amarasingam, 2015) with a population of 237,890 (Statistics Canada, 2023). Within Canada, Tamils fall under the largest visible minority population, South-Asians, who make up 7% of the country's entire population (Statistics Canada, 2023). The most condensed area in which Tamil-Canadians are located, is in the province of Ontario, with a population of 192,890, making up over 80% of the entire Tamil population in Canada (Statistics Canada, 2023). More specifically, 167,010 reside in the Greater Toronto Area, designating it as the epicenter of Canada's Tamil diaspora (Statistics Canada, 2023). These statistical numbers demonstrate the significant place that Tamil-Canadians hold within Canada, but in order to garner a more nuanced understanding of who Tamil-Canadians are, this introduction section of the literature review will move beyond the quantitative values and look at the qualitative experiences captured by scholars, starting with the nature of arrival of Tamils to Canada, their settlement transition, and their contemporary positioning today.

2.1.1 Origins of Tamil immigration to Canada

The history of Tamils in Canada dates to the 1940s, arriving predominantly as students from countries such as India, South Africa, Malaysia, and Sri Lanka (Thambinathan, 2022). By the 1980s, small community pockets began to form in urban centers such as Montreal, Ottawa, Windsor, Halifax, Winnipeg, Edmonton, and Vancouver, with an approximate total of 3000 Tamils. However, the most significant intake of Tamil newcomers to Canada began in 1983 when the events of "Black July" took place (Thambinathan, 2022). Black July was a large-scale,

state sponsored riot fueled by ethnic tensions between Tamils and Sinhalese in Sri Lanka (Gunasingam, 2014). The riots were rooted in extreme anti-Tamil violence resulting in the destruction of Tamil homes and businesses, and more horrifically, rape and mass killings (Gunasingam, 2014). As a form of resistance, the Tamil militant group, Liberation Tigers of Tamil Eelam (LTTE), were formed in opposition to the Sinhala state government and engaged in a full scale 26-year civil unrest that would only end in 2009 with the death of LTTE leader, Prabhakaran (Amarasingam, 2015). As a consequence, thousands of Tamils underwent forced displacement seeking refuge in other countries. At this time, Canada initiated a special measure program that would allow for Sri Lankan refugees to come to the country on compassionate grounds. The program was a result of a local demonstration in Toronto organized by the Tamil Eelam Society of Canada, pleading to ease regulations towards sponsoring their affected relatives back in Sri Lanka (Aruliah, 1994). The program became one of the most effective measures of protection, admitting 20,970 Sri Lankan refugees between 1989-1993 (Aruliah, 1994), with more arriving in the coming years.

2.1.2 Transition and Growth of the Tamil Diaspora in Canada

As the newly arrived refugees of the Sri Lankan civil war began to settle and start families, the Tamil diaspora itself grew. Evident shifts in beliefs and values began to emerge among different generations of Tamil-Canadians. O'Neill (2014) described how many of the Sri Lankan Tamil parents who had come from the war were reluctant to speak about it hoping to "leave the violence behind and look forward to a peaceful life for themselves and their children" (p. 127). With this shared attitude, Tyyska (2005) revealed that Tamil families demonstrated a high degree of resiliency during their immigration and settlement period. Although intergenerational frictions existed, especially when conservative cultural traditions concerned

with gender roles and relationships clashed with the younger generations' more liberal outlooks, parents continued to insistently engage their children in aspects of their Tamil heritage such as Bharatanatyam classical dancing, Carnatic music, and religious activities (Tyyska, 2005). But interestingly, the second-generation of Tamil-Canadians demonstrated an urge to know more about themselves beyond the superficial sense that their parents were providing.

Compared to their Canadian peers, the second-generation of Tamil youth shared the unique trauma of a distant ethnic conflict that would come to significantly shape their identity. Facing barriers in engaging in dialogue with their parents around the ongoing war at the time, many second-generation youths turned towards organizations such as university Tamil Student Association (TSA) groups, to build solidarity and a collective understanding of their experiences (O'Neill, 2014). More so than their parents, the second-generation of Tamil youth became increasingly engaged in political activism that would advocate for the human right violations that were occurring to Tamils back in Sri Lanka (O'Neill, 2014; Thurairajah, 2011). Unfortunately, the Tamil diaspora began to be viewed as a "troublesome minority obsessed by imported conflict," (O'Neill, 2014, p. 125) leading to the federal government's decisions to list the LTTE as a terrorist organization. Hyndman et al. (2023) highlighted how Canada had misinterpreted Tamil nationalism as a threat against "civilized" Canadian society rather than a community building towards their own sense of belonging. Despite the pushbacks, young Tamil activists had organized one of the largest and most effective political demonstrations in Toronto and Ottawa up until the end of the war in 2009 (Thurairajah, 2011).

Tamil representation in Canadian politics played a pivotal role in reshaping the understanding that Canadians would have of the Tamil diaspora. In 2011, Rathika Sitsabaiesan was elected as the first Tamil-Canadian member of Parliament for the Toronto riding,

representing a large population that resides in the area (O'Neill, 2014). A few years later, Gary Anandasangaree was also elected as member of Parliament, using his position to advocate and in 2014, successfully declare January as Tamil Heritage Month (Parliament of Canada, 2016). Similarly, Vijay Thanigasalam, upon being elected to the Legislative Assembly of Ontario in 2018, introduced Bill 104, Tamil Genocide Education Week, an act that resists the erasure of a history that shapes the Tamil-Canadian identity to this day (Province of Ontario, 2021). Tamil-Canadians have proven to be resilient as they continue to be actively engaged citizens and participants of their settlement society, while simultaneously advocating for critical issues in human rights and cultural preservation.

2.1.3 Where Tamil-Canadian Youth stand Today

Tamil-Canadians, at the least, hold duality within their identity, housing a minority ethnocultural identity simultaneously with a settler-colonial identity. Where newcomer Tamil refugees were forced to preserve their culture that was being actively erased, and the second-generation politically active in protesting the ongoing war, the post-war era of Tamil-Canadians struggled to find their purpose that would ground their Tamil identity while engaged in Canadian society. As a result, navigating these identities have created complex self-perceptions among current Tamil-Canadian youth that center around otherness. Shanmugaraj (2023) showed how this manifested through examining the colonization of Tamil names, where findings demonstrated that students use the anglicized or shortened version of their names in schools, imposed by their white settler teachers, and used their Tamil name strictly at home to maintain some sense of self. The sense of otherness was especially prevalent after Canada's decision in 2006 to label the LTTE as "terrorists," amplifying prejudiced attitudes towards the entire Tamil community (Kandiah, 2023; Shanmugaraj, 2023). Feelings of otherness were also reported in

Tamil-Canadian students who grew up in locations that had little to no Tamil communities, as many institutions, such as schools, prioritized white settlers to continue to hold positions of power (Kandiah, 2023; Obeyesekere, 2023). With white settlers imposing changes to a student's identity, a nation attacking the character of their community, and no one like them in a position of power to turn too, many of today's Tamil-Canadian students feel forced to slowly erase the Tamil within them (Kandiah, 2023; Obeyesekere, 2023; Shanmugaraj; 2023). In order to conceptualize the process of identity formation and negotiation, the next subsection addresses the theoretical understanding of identity and its practical unfolding in the school setting. Additionally, from this point forward, the scope of the review expands from Tamil-Canadian to South-Asian Canadian identities as specific literature on Tamil-Canadian identities does not yet exist within the education context.

2.2 Identity Formations and Negotiations

The development of identities is critical during an individual's adolescent years as they transition from childhood into adulthood. Youth go through a number of substantial changes as they grow up, some of which Hebert (2012) highlighted as leaving the comforts of home, parents, siblings, and childhood friends to pursue a new independent life; an increase in autonomy and choice but assuming more responsibilities; changes in behaviours and perspectives as new acquaintances are formed; and encountering intimacy and sexuality, to name a few. Adolescence is marked as a time when social acceptance feels most pivotal, where decisions are influenced by the need to fit in, no matter the cost. As such, this subchapter of the literature review unravels the theoretical perspectives that surround identity formation in ethnic and racialized individuals, the development of identity in schooling, and the particular experiences of identity by South-Asian Canadian students. In doing so, a deeper understanding

of the experiences of identity negotiation for Tamil-Canadian students is used to inform the study.

2.2.1 Theories of Identity

Identity has always been a study of interest, drawing on the curiosity of who exactly one is and how they conceptualize it. Beginning with the perspectives drawn from the modernist era, identity was conceived as a project to tackle due to its unknown nature (Bauman, 1996). With this notion, identity was to be built into a solid construct, slowly stripping away any uncertainty until it was neatly categorized and "fixed." At this time, assimilation theory was quite popular, marking ethnic identities as a problem to address as it did not fit well into the fixed identity constructs developed (Bauman, 1996). However, as a shift occurred into post-colonialism and industrialization, differing perspectives began to emerge, countering the idea of identity as stagnant and stable (Bauman, 1996). Ethnic identities began to be seen as malleable, dependent on particular circumstances. Drawing on social constructivism, the new perspective on identity concerned itself with the interactions that occurred between people and circumstances (Verhoeven et al., 2019), allowing identity to be constructed and deconstructed (Bauman, 1996). However, Hebert (2021) pointed to how social constructivism on its own still lacked in considering how space, time, and relation can continuously (re)shape the identity. Around the same time, psycho-social perspectives were rising, with works from Erikson (1959) and Marcia (1980) still being utilized today. The psycho-social model looked at how internal psychological processes, such as exploration of value, and commitment to decisions, impact identity development (Verhoeven et al., 2019). Despite its popularity, Chavez and Guido-DiBrito (1999) highlighted the problematic nature of the traditional psycho-social models that limit growth as linear and progressive rather than in constant reciprocal flux over a lifetime.

A more comprehensive and contemporary understanding of identity draws on Holland et al.'s (1998) concept of figured worlds, informed by a combination of culturalist perspectives and social-constructivism. A figured world can be defined as "a socially constructed realm of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others," (Holland et al., 1998, p. 52) offering it as a *site* for identity production. Figured worlds can be populated based on the various activities and/or social environments one intersects and engages in, allowing for people to (re)shape new identities. Urrieta (2007) reminds us that although figured worlds are viewed as "sites of possibility" (p. 109) that give agency to identity, it is simultaneously understood as sites situated in a social reality mediated by relations of power. Thus, figured worlds resists static notions of culture and considers the dialectical and dialogical activities that inform people's identity. With figured worlds composed of culture, possibility, and power, Holland et al. (1998) set in place three considerations for the production of personal and social identities within figured worlds: negotiations of positionality, space of authoring, and world making. Positionality is seen as the positions granted to an individual within different figured worlds (Urrieta, 2007). For example, the positions I take up within the figured world of my family include daughter, sister, and partner. However, Holland et al. (1998) described that individuals are limited to either accepting, rejecting, or negotiating the positions offered to them and the historical narratives attached to those positions. Inspired by Bakhtin's concept of dialogism, Holland et al. (1998) brought forth "space of authoring" to contextualize the internal dialogues that people undergo when negotiating their positionality. Although the authorship does not change the outcome of choice that a person is limited to with their offered social positions, it does pave the way to *how* the person can respond to the choices (Urrieta, 2007). Finally, world making can be evoked by

the “activities” engaged in during the authoring space. Drawing on Vygotsky’s idea of “play,” Holland et al. (1998) explained how social plays that involve the creation of new artifacts, discourses, and acts within marginal communities, creates new (liberatory) figured worlds. Through continual participation within a social space, "the ability to sense the figured world becomes embodied over time" (Holland et al. 1998, p. 53) and as such, identity in the figured world of schooling will be investigated further in the next section.

2.2.2 Identity formation in the education context

Identity formation and education are mutually connected in a way that a process is to its context, in this case, the institution (Hebert, 2001). Schools act as sites of social reproduction that impose dominating biases and assumptions based on constructions such as gender, sexuality, race, ethnicity, religion, language, ability, and class, which evidently implicate the identity formation process for students (Hebert, 2001; Koggel, 2018). To garner a global perspective on the role of school in adolescent identity development, Verhoeven et al. (2019) undertook a literature review of 111 studies and utilized comparative analysis to produce two key findings: the unintentional and intentional ways in which schools and teachers affect youth identity development.

The unintentional impacts that afford and/or constrain the identity development of youth in schools were traced back as products of what Jackson (1968) coined, the hidden curriculum. The hidden curriculum is made up of a set of norms, assumptions, and values based on dominant cultural reproductions of settler-colonialism, neoliberalism, and/or patriarchy, which in turn mold the attitudes and practices of educators that “unintentionally” marginalize minority students (Apple, 2004; Giroux & Penna, 1979; Hebert, 2001; Verhoeven et al., 2019). The hidden curriculum tends to maintain its covert nature as the educational practices are deemed normal,

unproblematic and, in some cases, efficient (Apple, 1990). Ways in which the hidden curriculum manifests itself in schools are through mediums such as voices, texts, events, practices, and gestures. For instance, a teacher's expectations of a student based on stereotypes unjustly limits the student's full potential in learning. This practice is especially prevalent in assessments that stream students into different levels of learning, often acting as a barrier to upward mobility for immigrant and racialized students (Hebert, 2001). In essence, the hidden curriculum encourages minority students to internalize their oppression, fracturing the possibility for a healthy negotiation between their identities.

On the other hand, Verhoeven et al. (2019) also highlighted the intentional impacts on youth identity development that schools and teachers plan for through their organized learning opportunities. Their analysis was able to categorize three modes of exploration that are undergone in the classroom to promote identity development: in-breadth exploration (stimulates exploration of new identity positions), in-depth exploration (deepens exploration of already existing self-understanding), and reflective exploration (fosters exploration of understanding one's own thoughts and feelings). Drawing on an Eriksonian conception of identity formation, Flum and Kaplan (2012) examined global case studies that intentionally implement identity developing learning opportunities in school. One such study, using in-depth exploration, incorporated interventions that integrated students' perspective and interest to disrupt resistance or lack of motivation in learning. In doing so, students were not only given voice and choice, but were also able to relate their lived experiences to academic content, promoting identity negotiation and overall learning (Flum & Kaplan, 2012). Another study looked at the connection between identity and career aspirations in youth. Educators who were cognizant of their students' career pursuits were able to actively utilize students' self-oriented and purpose driven decisions

to make school meaningful, resulting in a greater shift in well-being and self-worth. Finally, Flum and Kaplan (2012) also uncovered the importance of school climate in a study that looked at teachers as role models, and schools as caring. A combination of students perceiving their teachers as worthy mentors and schools as concerned with their "whole" self beyond the academics, demonstrated a constructive impact on youth identity development. Thus, both Flum and Kaplan (2012) and Verhoeven et al. (2019), emphasized the preconditions necessary for schools to intentionally implement healthy identity development in youth; that is, meaningful learning experiences and a supportive classroom climate.

However, these global studies did not capture the particular nuances that occur in the context of Canadian education, hence, Hebert's (2001) critical literature review around identity work of youth in Canadian education gives further insights to consider. In the study, Canada's multiculturalism response to the prevalent inequities for minority students in schooling are deconstructed through a postmodernist understanding of identity. Hebert (2001) exposed how multicultural education in Canada, driven by the Multiculturalism Act (1985), understands identities through a modernist paradigm which frames identity as a problem. In doing so, schools impose a deficit-based perspective on minority students, as "objects of hatred" (Hebert, 2001, p. 162) without taking accountability for perpetuating racism and discrimination through normalized practices of separating, silencing, and labeling. Thus, multicultural education takes on a performative nature that focuses on "feasts and festivals of diverse cultural groups with sporadic curricular inclusion of heroes and heroines," while simultaneously and actively assimilating the minority students into the dominant, Eurocentric culture (Hebert, 2001). Instead, Hebert (2001) recommended schools shift towards critical multiculturalism, which demands exposing students to the power structures that impact their experiences and perception of self

when learning. As such, students are presented their "space of authorship" to respond to how they will negotiate their identity within the figured world of schooling. In addition, critical multiculturalism engages schools in social justice-based, anti-oppressive pedagogies that would constructively disrupt and dismantle barriers to healthy identity formation and negotiation, encouraging a new liberatory figured world of schooling for minority students. As the study specifically sought to understand the specific identity negotiations of Tamil-Canadian students but lacked the literature to do so, the next section slightly broadens the scope and looks into the identity negotiations South-Asian Canadian youth undergo.

2.2.3 Identity negotiation for South-Asian Canadian youth

The complex nature of identity is examined by Sundar (2008) who used a grounded theory approach to examine second-generation South-Asian Canadian youth's perception of their identity. Using such a theoretical framework steps away from the typical critical lens that would place participants in a position that begins with being oppressed, further insinuating a damaged-centered narrative (Tuck, 2009). Although critical theories are still crucial for deconstructing structural inequalities, starting with the raw stories of participants guided by their own agentic direction will generate new and unique knowledge that can later be analyzed with theories such as Critical Race Theory and Whiteness Theory (Navaratnam, 2011; Samra, 2020). As such, Sundar (2008) had broken binary notions of identity and related its complexity in a "meaningful way which [goes] beyond simply placing youth at risk or acting as a protective factor" (p.258).

As described earlier, identity is not fixed but rather flexible constructs that shift across time and place depending on the circumstances (Hebert, 2012; Sundar, 2008). The various dimensions of identity are constantly interweaving within spaces, bringing about complicated relationships that make it difficult to isolate any particular identity factor as either protective or a

risk for youth (Sundar, 2008). An example of the complexity of identity dimensions can be illustrated through the examination of the model minority myth, which highlights the success of Asians in colonial states as indicative that any visible minority can overcome systemic barriers (Shu, 2024). Navaratnam (2011) shared how the stereotypes from the model minority can render South-Asians invisible at times, such as in schools as academics, but can be flagged in airports as potential terrorists. However, South-Asian Canadian youth have described taking full advantage of this flexibility by moving between identity dimensions or figured worlds that allow them to "brown it up" or "bring down the brown" so that they can achieve their desired goals (Sundar, 2008). In adapting to the norm, South-Asian youth have come to understand the capital that certain dimensions of their identity offer and strategically use them to maneuver towards constructive outcomes (Sundar, 2008). This is a crucial finding that aligns with Holland et al.'s (1998) figured worlds, in that youth have agency to productively negotiate with their identities as opposed to being powerless in spaces that exclude or silence them.

Both Samra's (2020) autoethnographic and critical ethnographic study, and Desai and Subramaniam's (2003) focus group study informed through an anti-racist framework, were able to deduce that one of the most impactful spaces that South-Asian Canadian youth felt "othered" in was within K-12 classrooms. The act of othering was often facilitated by teachers and administrators who would reinforce racism while denying its very existence, allowing for its covert forms to permeate throughout the walls of classrooms (Desai & Subramaniam, 2003; Samra, 2020), a manifestation of the deeply ingrained hidden curriculum (Navaratnam, 2011; Samra, 2020). The model minority myth falls under this hidden curriculum, allowing educators to justify streaming Asian students in heavily math- and science-based fields (Ghosh & Guzder, 2011; Navaratnam, 2011). The hidden curriculum is further exacerbated by mandated documents

such as provincial curriculums which also carry Eurocentric perspectives, invalidating many wisdom-based knowledge systems outside the colonial norm and erasing contributions made by racial minorities in Canada (Aikenhead, 1996; Higgins, 2014). In essence, South-Asian Canadian youth did not find themselves reflected in the school environment in which they are required to be fully immersed, effectively silencing their home identity (Dei & Subramaniam, 2003; Samra, 2020).

A final important consideration Desai and Subramaniam (2003) and Navaratnam (2011) brought forth was how home life (another figured world) affects the South-Asian Canadian identity as well. With many South-Asian Canadian parents being newcomers and/or first-generation themselves, Desai and Subramaniam (2003) remind us that in the face of the external forces of domination, parents must legitimize their values. South-Asian Canadian parents often get labeled as “strict” but the “excessive insistence and adherence to ‘culture’ and ‘tradition’ is a reflection of relations of power in Canada as opposed to something intrinsic in the culture of origin or its traditions" (Desai and Subramaniam, 2003, p. 142). Additionally, in leaving their community from back home, South-Asian parents have expressed efforts to regain their lost social status through affirmation from fellow South-Asian parents via their children’s professional accomplishments. In particular, South-Asian parents become highly invested in their children’s career paths and place an emphasis on pursuing sciences and math in order to become engineers, doctors, or accountants (Navaratnam, 2011). In fact, many South-Asian parents sacrifice their own career’s upward mobility to ensure their children grasp the full benefits of a Canadian education (Desai and Subramaniam, 2003). In doing so, South-Asian parents reported having struggled with economic security which further justifies their high expectations for their children to pursue a “safe and secure” profession. Many South-Asian youth make evident their

awareness of this hardship and, in turn, report feeling indebted to their parents (Desai & Subramaniam, 2003). But having these phenomena paired with teachers streaming based on the model minority myth, can pressure South-Asian youth into academic spaces that they originally did not anticipate pursuing. As a result, Navaratnam's (2011) study showed that many South-Asian youth were left with feelings of shame and guilt throughout their schooling when they could not fulfill their predetermined paths.

In the next subsection, a closer look at how identity formation and negotiations play out in the science classroom is employed. As the scope of the study narrows down to a specific subject field, the literature around specific ethnicities within the subject's realm also becomes limited. For that reason, the next section concerned with science education included broad findings of the experiences of Black, Indigenous, and People of Colour (BIPOC) students which still encompass Tamil-Canadians, but in a generalized notion.

2.3 Curriculum and Pedagogy in Science Education

The following sections examines how science education in Canada is embedded with settler-colonial practices and the implications they bring forth for students of various marginalized ethno-cultural backgrounds. Understanding how science education shapes student identities require first deconstructing the historical and epistemological foundations of both Modern Western Science (MWS) and the Nature of Science (NoS). Following the analysis is an examination of the role MWS and NoS play in Canadian science education and its implication on minority students. Finally, studies exploring students navigating figured worlds within science education are revealed to provide future possible outlooks.

2.3.1. Historical and Epistemological Foundations of Science Education

Modern Western Science (MWS) plays a pivotal role in many provincially mandated science curriculums across Canada (Aikenhead, 2006a; Anderson et al., 2021; Higgins 2014;). MWS came about during the 18th century when there was a demand to find a universal means to master the natural world (Held, 2023). European scientists described MWS in a value-free and methodological manner, establishing it as a rational and objective way of knowing that could be universally applied to all engaging in scientific endeavours (Merton, 1973; Held, 2023). However, in the second half of the 20th century Karl Popper (1962) challenged this universal notion by emphasizing that new knowledge is created through hypothesizing theories for real world problems that are embedded in cultural and historical contexts. Thomas Kuhn (1962) added to this by highlighting the long period of scientific revolutions arising from various paradigms, interrupted with the imposition of the MWS paradigm. He pointed out that paradigm shifts do not happen naturally and are often aided by peer pressure, ultimately debunking the pursuit of science as rational and objective in the first place (Kuhn, 1962). There were many debates about whether interest, biases, values, and worldviews should play a role in science. Feminist scholars, Helen Longino (1990), and Sandra Harding (1998) especially fought for social values to be viewed as relevant rather than a risk in the scientific process. Harding (1998) even claimed that the knowledge of the world could be more objective by gathering the perspectives of the marginalized to understand the circumstances of their positioning and validate their lived experiences as sources of knowledge. Harding concluded that science is a collection of principles and practices from various individuals, social groups, and cultures, hence a field that cannot be fully comprehended through one single paradigm (Harding, 1998; Held, 2023).

While Modern Western Science is often portrayed as embodying universal, objective methods and knowledge, the framing of the Nature of Science (NoS) in contemporary science

education reveals a more contested and socially embedded picture. Historically emerging from mid-20th century efforts to improve scientific literacy, NoS refers to the underlying assumptions, values, and practices through which scientific knowledge is developed (Lederman et al., 2002). However, Rudolph (2000) argues that curricula have long defaulted to a "consensus view" of NoS, where science is presented as a unified, value-free method that objectively uncovers truths about the natural world. He critiques this portrayal as overly simplistic and historically inaccurate, failing to account for the diverse ways of doing science and the socio-political context in which science takes place. Similarly, Hodson (2014) identifies the consensus view, highlighting it's empirical, theory-laden, tentative, and universal nature as dominant in curriculum documents, but insufficient for preparing students with a nuanced understanding of science. He advocates for a more critical approach that includes the ethical, political, and cultural dimensions of scientific work. In this view, science is not merely a neutral pursuit of truth but a human activity shaped by power, purpose, and context. Furthermore, Taber (2008) contributes to this conversation by proposing a curricular model that balances accessibility for learners with an accurate representation of science knowledge, encouraging students to grasp the socially situated and evolving nature of science inquiry. Together, these scholars argue for moving beyond the myth of science as purely objective and universal, urging educators to present science as a culturally embedded, dynamic practice. Such framing opens up more inclusive identity positions for student, particularly those from historically marginalized communities.

2.3.2 Structures and Critiques on Canadian Science Education

The Pan-Canadian Common Framework of Science Learning Outcomes, developed by the Council of Ministers of Education, Canada (CMEC) in 1997, guides a coherent vision for science education across provinces and territories. Its goals emphasize developing scientific

literacy through competencies in inquiry, critical thinking, and understanding science within social and environmental contexts (CMEC, 1997). The framework foregrounds equity and inclusion by advocating for diverse learning experiences and encouraging connections between science, technology, society, and the environment (CMEC, 1997). However, scholars like Aikenhead (2006b) critique the framework for upholding a narrow view of the NoS (as objective, universal, and culturally neutral), which reflects the dominance of Modern Western Science and risks marginalizing Indigenous and other knowledge systems. Murray (2015) similarly argues that despite aspirations towards a Canadian science identity, the framework largely reproduces Western paradigms, which may not reflect the cultural or ecological realities of multicultural and circumpolar communities.

Provincially, Ontario's science curriculum aligns broadly with the Pan-Canadian Framework's vision, emphasizing inquiry skills, scientific literacy, and STSE connections (Ontario Ministry of Education, 2008). Yet, implementation reveals tensions. The first and most alarming issue is that science education alienates students with marginalized ethno-cultural identities that do not fit within the Eurocentric narrative, including Tamil-Canadian youth (Aikenhead, 2006a; Anderson et al., 2021; Higgins, 2014). The second is that Canada's focus on using the Eurocentric lens found within MWS portrays an image that it is the only valid and reliable method of understanding the world due to its rational and objective nature (Aikenhead, 2006a; Held, 2023). This leads to the third issue which is that students grow to be indoctrinated into valuing Eurocentric ideologies in science over their own to understand how the "real" (that is, settler-colonial) world works (Aikenhead, 2006a; Higgins, 2014). A specific example of this within the South-Asian context would be the use of modern medicine over traditional ayurveda, as MWS promotes pharmaceutically tested drugs over natural herbal treatments. Fourth, students

connect science as a tool needed for out-of-school settings, but when that connection is missing due to the disconnect from their home life, academic science concepts lose their meaning and purpose (Aikenhead, 2006a; Higgins, 2014). This accumulates to the final issue which is that science in schools is seen as a subject needed for credentials rather than a genuine interest, thus leading to an extreme decline in students pursuing science in post-secondary studies, furthering the underrepresentation of BIPOCs in the field (Aikenhead, 2006a; Anderson et al., 2021). In the case of South-Asian youth who are pressured to pursue science, viewing the subject as credentials morphs science learning into a barrier that must be overcome rather than a qualitative experience.

To ease the tensions that science education creates for students of marginalized ethno-cultural backgrounds, research suggests students engage in cultural border crossing. Aikenhead (2006a) described cultural border crossing as "a metaphor that captures the act of negotiating the transition from, for instance, a student's home culture to the culture of school science" (p. 119). In order for one to cross the border, they must have the ability to think differently depending on the cultural context, be able to speak about that difference, have the courage to navigate within unfamiliar spaces, and finally, have the skills to resolve conflicting views (Erikson, 2004). A few critiques have been made towards border crossing, including Aikenhead (2006a) who pointed out a limitation in the concept as it can be too advanced for elementary students, an age group that typically has not yet developed the skills to contextualize their metacognitive thoughts around cultures. Additionally, Higgins (2014) warned that cultural border crossing can "uphold and reproduce Eurocentrism and Whiteness if their final objective is a unidirectional border crossing of youth into the culture of power." Thus, educators must consider how border crossing can occur bi- or multi-directionally (Higgins, 2014) to reap its full benefits towards healthy identity

formation and negotiations. In the following section, studies that look at the navigation of figured worlds within science education will be reviewed to understand how cultural border crossing works in practice.

2.3.3 Figuring Worlds in Science Education

In order to understand the figuring of worlds within science education, three studies (Gonsalves et al., 2013; Price & McNeill, 2013; Tan et al., 2013) were selected that drew on Holland et al.'s (1998) concept of figured worlds, utilizing case study methodology within a science learning context (both formal and informal), and included students participants with a range of ethnic, racial, linguistic, and socioeconomic diversity, to best represent the experiences Tamil-Canadians would have with identity negotiation in science education. In analyzing the studies, three themes emerged around the figuring of worlds in science that impact identity including: the role of interest, the role of informal science, and the role of experiences.

To begin, Gonsalves et al. (2013) highlight the importance of re-figuring science within the context of student lives by engaging with their desired interests. These interests, often seen as a distraction or barrier to the curricular science content, can come with resources that can be mobilized from their locally grounded figured world. For examples, the participants in Gonsalves et al. (2013) study of girls re-figuring of science in an out-of-school club, were curious about issues related to sex and sexuality, and as such, drew popular culture media into their figuring of science as a self-initiated action, "rather than [the educator] attempting to retrofit their experiences into science" (p. 1089). The traditional colonial figured world of science is one imbued in power and as such, comes off as delivered rather than constructed by students. By utilizing cultural resources and histories to ground science conversation, students can have an agency in traversing the cultural border crossing between their figured worlds.

Interest with science does not necessarily have to come from school science and can be found in informal science spaces such as summer science internships, after-school science clubs, and even family members in science fields. For instance, in Tan et al.'s (2013) study of middle school girls negotiating identities in science, one participant indicated they desired becoming a green energy engineer after spending time at their after-school green club. Similarly, another participant shared how they had two uncles who were doctors which inspired them to pursue medicine (Tan et al., 2013). As such, situating science in students' everyday activities, such as the described informal spaces, can help to re-imagine science as including their lives (Gonsalves et al., 2013, Tan et al., 2013).

The informal science spaces not only foster interest but provide the opportunity of experience with science in meaningful and realistic encounters (Price & Niell, 2013). Experiential learning is crucial in the figuring of worlds in science as it offers students a chance to "pivot" (Holland et al., 1998) in and out of authentic worlds of science and their home communities (Price & Niell, 2013). Gonsalves et al. (2013) also describe the use of informal science spaces as hybrid spaces that become more than just celebrating diverse ways of knowing but transforms into culturally sustaining pedagogies (Paris, 2012), that actively integrate students' prior knowledge and cultural resources to disrupt dominant systems.

In essence, the concept of figured worlds in science is constructive in affording identity negotiation for minority students, allowing for the "re-figuring [of] their experiences as science-experiences; and the re-figuring of science as an every-day experience" (Gonsalves et al., 2013, p. 1901).

2.4 Gaps in Literature

A review of the literature indicates a broad conclusion that Tamil-Canadian youth are, in fact, contested between their Tamil home identity and Canadian school identity, despite their resilient past with Tamil language and culture. The scholarship around identity formation and negotiations makes it prevalent that the Canadian identity is a dominating force due to its construction under Eurocentric ideologies. The power dynamics between the settler identity and minority identity become even more obvious in the school setting, a time that is most critical to a youth's development of the self. As a site of social reproduction, schools have consistently engaged in privileging settler-colonialism as the norm while silencing other worldviews, disrupting any productive and constructive identity negotiations students need to undergo. Similarly, an investigation of the nature of science knowledge production has led to understanding how MWS uses notions of objectivity and universality to establish dominance over other ways of knowing in science. An anti-colonial lens calls to decolonize science education by incorporating pluriversality, that is, students' figured worlds to disrupt the dominant settler-colonial narratives that silence and even erases parts of the minority identity. To benefit from multiple ways of knowing, students must engage in cultural border crossing between figured worlds which is currently lacking in the science classroom but has been seen most effective in informal science spaces that creates an authentic world of science tied to a student's everyday lives.

The general nature of this literature review leaves a gap in knowledge about the specific experiences of Tamil-Canadian youth in science classrooms. The literature around marginalized students within science classrooms is limited to Black and Indigenous youth, who are typically the groups that have to endure stereotypes and deficit-based views from educators, and as such, have their own unique experiences. As mentioned earlier in the review, Asian students (including

East and South), face an entirely different experience through the model minority lens which comes with its own facets of issues, specifically the internalized oppression to live up to the settler-colonial expectations of a model minority. Additionally, there is a gap in understanding the identity negotiation process of specific South-Asian groups, such as Tamil-Canadians. Over-generalizing the results of this review can lead to "painting everyone in a particular group with the same brush" (Navaratnam, 2011, p. 24). It is crucial to understand the context of the ethno-cultural group of study before applying these findings. For instance, even the specific study of Sri Lankan newcomers to Canada must be critical of the different circumstances between Tamils and Sinhalese peoples, where one group fled from genocide, and the other due to poverty and unemployment from the civil war. This illustrates the need for additional studies to be conducted to capture the specific nuances of particular South-Asian groups. For that reason, this research highlights the value and necessity of studying Tamil-Canadians' experiences in K-12 science education, given the lack of existing literature on the topic.

Chapter 3. Crafting the Inquiry

This research looked to unveil the lived experiences that Tamil-Canadian students have in Ontario K-12 science classrooms. For that reason, a methodology that integrated a qualitative approach, that is, a consideration for the social, cultural, and historical context that makes up one's reality, was required (Mulvihill & Swaminathan, 2017). Additionally, the study was driven by the voices of Tamil-Canadians, and as such, was grounded in a methodology that offered power and authority to the participants to share their story (Atkinson, 2007; Connelly & Clandin, 1990). Therefore, I chose to use narrative inquiry as the methodology.

Narrative inquiry is concerned with how humans experience the world. Naturally, humans find themselves engaged in storytelling to explain the phenomenon they experience. According to Connelly & Clandinin (1990), the phenomenon then becomes the story and the inquiry into it is the narrative that emerges. Narrative inquiry is unique in that it disrupts the typical power dynamic between researcher and participant, and instead calls for the researcher to fully immerse in the narrative as well. Barrett and Stauffer (2009) suggest that, "narrative inquirers are engaged in 'living' with and through stories in research context; in order to work towards an understanding of the varying and complex meanings and interpretations all participants bring to their experiences" (p. 11). Therefore, the starting point of narrative inquiry is with the researcher's disposition. Who is the researcher? Why are they engaged in this research? What outcomes do they seek from it? To answer these questions, a deconstruction of my positionality within the context of the research will be examined next.

3.1 Positioning the Researcher

My investment into the Tamil-Canadian community comes from my own status as a second-generation Tamil-Canadian. My parents are first-generation settlers here in Canada,

having come from Sri Lanka in the 90s. My father (Appa) came as a refugee fleeing the Sri Lankan civil war that was persecuting Tamils, like himself. The circumstances that forced them to leave their homeland left them with a longing and desire to hold onto the one part that tied them to their previous home, their Tamil identity.

One of the earliest struggles I witnessed my parents go through was a lack of Tamil community in the small eastern Ontario city they had chosen to live in. The city had a population of 50,000 people and was predominantly white. The ratio of racialized students to white students in my classrooms was typically 1:20. It was inevitable that I would begin to socialize into the settler-colonial culture in which my classmates were also normalized into. But my mother (Amma) always caught on. She noticed her children preferring to speak English over Tamil at home, complaining about the Sri Lankan lunches she would pack for school, and being embarrassed to engage with Tamil entertainment such as Kollywood. Amma did her best to nip in the bud what was the slow devouring of her children's Tamil identity, setting rules such as only Tamil language use at home and enrolling us into Tamil music classes. Looking back now, I feel proud of her efforts to go against the grain and to stay true to our Tamil culture. But the forces of assimilation are a powerful one, and without a strong community to back Amma up, she stood little chance to fully preserve our Tamil identity.

You may be questioning where my Appa is in all of this. Having come to this country with nothing to his name, he was also forced to fully immerse in the settler-colonial culture to put food on the table for our family. Appa had faced many barriers himself, including attending post-secondary schooling for computer sciences but never graduating due to difficulties in attaining his English language credentials. His many setbacks forced him to work several jobs, covering daytime and night-time shifts. Unfortunately, overworking himself led to his downfall,

neglecting his health, resulting in his early diagnosis of dementia and eventual passing. Now I bring this forth because Appa's experiences greatly influenced the paths I had taken and who I am today.

My parents never wanted their kids to struggle in life as they had. They wanted us to have a head start and believed that came with a good quality education. I grew up hearing my parents say on repeat: "Puvithira is so smart," "Puvithira gets top grades in science and math," "Puvithira is going to be a doctor," "Puvithira is going to take care of us." Despite my parents' intentions for these accolades to be encouraging, they felt like expectations, resulting in me pursuing science so as not to betray my parents rather than of my own interests and desires. I noticed that some fellow Tamil friends were experiencing the same pressures to pursue careers in medicine or engineering too. In fact, it was not uncommon to come across aunties and uncles bragging about their kids' grades in STEM, their acceptance into prestigious STEM programs, or their career accomplishments in STEM. I am fully aware I cannot generalize that this attitude is shared amongst all Tamil parents, but the pattern I witnessed was hard to overlook. I began to question, then, how do Tamil-Canadians find themselves in science classrooms? And because of the nature of their arrival, what experiences do they walk away with?

In my research, I position myself as an individual that does not necessarily internalize all the beliefs, values, and norms my parents held onto through their Tamil culture, nor do I fully embody settler-colonial ideologies taught to me in school. I once considered myself a settler, cognizant of the fact that the traditional lands we Canadians inhabit are stolen from First Nation, Inuit, and Métis communities. However, the term "settler" was unsettling in its nature, as in to take over and remain stagnant. I did not want to sit in compliance with settler-colonialism, and as such, turned to Koleszar-Green (2019) who brought forth the term "uninvited guest" to indicate

an individual who wishes to draw on their privilege to work in allyship alongside Indigenous communities. Thus, as an uninvited Tamil-Canadian guest, I navigate a space between my two ethnocultural identities, perhaps treating the hyphenation in Tamil-Canadian as a bridge between two worldviews. This unique lens, which offers pluriversality, and my experiences, as a child of newcomers, directly affected the research question, rationale, structure, and approach. In this way, my positioning had already provided the first breath of this living narrative and will continue to do so throughout this research process.

Ontological and epistemological stance

In this qualitative research study, I adopted an ontology of experience with critical epistemology. An ontological stance centered in experience allows for "a conception of reality as relational, temporal, and continuous" (Clandinin & Murphy, 2009, p. 599). By placing human experience at the forefront of how we know what we know, existence can be seen as a process of negotiation within social constructs. Past actions situate the present and implicate the future, creating a reflexive positioning to understanding reality.

However, to engage in this reflexivity, which is to know how I understand our reality, I drew on a critical approach that took into consideration the nature of power relations within social, cultural, political, and historical contexts (Foucault, 1982). In doing so, I questioned and challenged dominant norms and assumptions which are established as "universal truths" and instead sought to give voice to the marginalized whose experiences have been silenced (Mulvihill & Swaminathan, 2017). From this, both equity and pluriversality emerge, enhancing our overall understanding of our existence.

3. 2 Narrative Inquiry

Narratives carry a long history, going back to ancient folklore and the passing of traditional oral histories (Atkinson, 2007; Barrett & Stauffer, 2009; Connelly & Clandinin, 1990). In fact, early-forms of narratives, such as storytelling, have been connected to the emergence of conscious thought (Barrett & Stauffer, 2009). Bruner (1986) proposed narratives as one of the modes of thinking that evokes a meaning-making process of a particular experience within a broader and holistic context. The alternative was paradigmatic, concerned more with establishing universal truths. However, paradigmatic thinking as a positivist approach works perpendicular to the ontological and epistemological stance of this study, thus, will not be investigated further. Narratives as a method of inquiry emerged in the late 20th century, when an interest in qualitative research grew (Barrett & Stauffer, 2009). Qualitative research was enticing in its re-conceptualization of the relationship between researcher and participant, utilization of words as data, ability to examine local and particular experiences, and possibility to evoke interdisciplinary findings (Barrett & Stauffer, 2009). Additionally, life narratives, in particular, were especially needed from marginalized individuals in research studies to balance the data that had since been predominantly collected from a positivist perspective that silenced their experiences (Atkinson, 2007). As such, the historical development of narrative inquiry can be seen across a variety of disciplines including psychology (Bruner, 1986; Erikson, 1963; McAdams, 1993), sociology (Becker, 1976; Blumer, 1969), anthropology (Langness, 1965), history (Langer, 1991), literature (Freeman, 2002), philosophy (Widdershoven, 1993), and education (Clandinin & Connelly, 1990, 2000; Dewey, 1938; Schwab, 1978).

In the field of education, researchers have moved away from their quest to find singular truths and turn towards narrative inquiry as a method to describe local processes and theorize specific problems. Rabelo (2022) described educational institutions as complex, embedded in

socio-political ideologies, and composed of diverse individuals who work in continuity with each other. Beliefs, values, and assumptions are all integral components that impact the educational experience of the individual and community, and for that reason, require a methodology that can capture these qualitative factors to understand the specific phenomena under study.

Dewey (1938) was one of the earlier education scholars whose work around the philosophy of education was deeply rooted in experience. He began to connect life experiences within education as both personal and social, thus considering the situation, context, and history within a research phenomenon. Later, Schwab (1978) brought in the perspective that the inquiry into experiences is one that is fluid and dynamic. Where one inquiry may produce knowledge, another inquiry may change that knowledge as real-life situations and context also change. Finally, Clandinin and Connelly (2000) disrupted the "formalists" notion that theory guides the research in education instead of the experience. By prioritizing the experience as the starting point of the inquiry, broader understandings that are not contained within the limitations of a theory can be achieved. Together, Dewey (1938), Schwab (1978), and Clandinin and Connelly (2000), built a foundational understanding in educational research concerned with narrative inquiry, where experiences are context-dependent, fluid, and pivotal rather than fixed, stable, and secondary (Phillion & He, 2010).

With this understanding, narrative inquiry holds tremendous potential in bridging the individual life in its parts to the whole, as described by Atkinson (2007):

> The telling of stories affords us a subjective perspective on one's life as it has unfolded while at the same time giving us a glimpse into the ongoing role of how those stories continue to live for and within the teller. (p. 19)

It is with this holistic outlook that I employed narrative inquiry in this research to collectively understand how the parts of the Tamil-Canadian experiences in science classrooms, contributes to the whole of the Tamil-Canadian identity.

3. 3 Recruitment

As this is a narrative inquiry that drew on lived experiences, the source of the data came directly from participant engagement. Therefore, an inclusion criterion was set up to recruit appropriate participants including: (1) individuals identifying as Tamil-Canadians; (2) currently enrolled in any undergraduate program; (3) have taken any Ontario secondary school (Grades 9-12) science courses; and (4) have access to Microsoft Teams. The criterion ensured participants reflected the ethnocultural group of study but also had recent and required science experiences to share relevant stories needed for the co-construction of the narrative (Grossoehme, 2014). Additionally, the selection of undergraduate students over high school students offered more space to include reflexive questions that could connect past experiences to their present endeavours. Finally, careful consideration was taken into account to recruit all across Ontario, as a specific focus on highly dense Tamil-population areas such as Toronto, Ontario, would omit the nuanced experiences of Tamil-Canadians who grew up as the minority population.

After receiving Research Ethics Board approval (see appendix A for the certificate of approval), I sent a request to forward an email invitation with a call for participants to 13 Tamil Student Association (TSA) groups in post-secondary institutions across Ontario including: University of Windsor, Western University, Brock University, McMaster University, University of Guelph, University of Waterloo, Wilfrid Laurier University, University of Toronto, York University, Trent University, Queen's University, and University of Ottawa. The email invitation included a document that contained a brief description of the study, the criteria for participant

selection, and my institutional contact info where participants could request to participate in the study and/or ask any further questions or concerns. Potential participants who met the criteria and self-identified received an informed consent form (see appendix B) to complete before any data collection began. To ensure a diversity of Tamil-Canadians were represented within the data, potential participants were given a short demographic questionnaire to complete over Microsoft Forms. The form asked for: the participant's full name; gender; their undergraduate major; the K-12 Ontario science courses they have taken; and region of K-12 schooling (e.g. Greater Toronto Area). If selected, the participant then received an interview booking email where I negotiated with the participant on a mutually agreeable date and time to conduct the online interview. The email also included the interview protocol to help the participant prepare for the interview (see appendix C). Once the maximum number of participants was selected, remaining requests were kindly notified that the participation spots had been filled.

3.4 Data Collection

Narrative inquiry is not bound by specific parameters and prescribed steps. Rather, narrative inquiry is flexible in its data collection methods including field notes, journal record, interviews, storytelling, letter writing, auto/biographical writing, and more (Connelly & Clandinin, 1990; Savin-Baden & Niekerk, 2007). However, if there is one key consideration to have within all the data collection tools, it is in how the data collection is facilitated by the researcher. As mentioned earlier, narrative inquiry is shared and relational work, where the researcher is deeply involved in the research relationship. Connelly and Clandinin (1990) make it imperative that entry into the work is negotiated as it is an ethical matter. To put it into context, “the idea of friendship implies a sharing, an interpretation of two or more persons' spheres of experience. Mere contact is acquaintanceship, not friendship. The same may be said for

collaborative research which requires a close relationship akin to friendship" (Clandinin & Connelly, 1988, p. 281). For researchers to build such relationships requires feelings of connectedness facilitated through care and shared purpose and intentions (Connelly & Clandinin, 1990). Furthermore, empowering the participants by taking up the position of "listener" is crucial when engaging with their stories, in order for them to gain authority and validity in their voice (Atkinson, 2007; Connelly & Clandinin, 1990; Savin-Baden & Niekerk, 2007). With a premise on relationality, I drew on two specific data collection methods, critical autobiography (Walker, 2017) and life story interviews (Atkinson, 2007), to collaboratively engage with my participants in co-creating a collective narrative.

Critical autobiography allowed for myself, the researcher, to blend my personal narratives with systemic thinking (Walker, 2017), tying together the individual experience to the larger cultural, social, and political context in schooling. The critical component comes from the researcher's reflexivity to challenge dominant norms and assumptions by deconstructing the self in tangent with society (Mulvihill & Swaminathan, 2017). The reason critical autobiography was selected was to utilize my insider perspective on understanding the schooling experiences of Tamil-Canadians. Additionally, by engaging in critical autobiography, I demonstrated vulnerability to my participants that I am committed to co-creating a narrative together, reinforcing collaborative relationships. In autobiographical writing, the primary source of information is the researcher's own life (Cooper & Lilyea, 2022). For this portion of the study, self-reflective data was collected in the form of chronologically listing major events within my K-12 science education experience that pertain to my Tamil-Canadian identity. This is a data generation exercise, "in which you describe events and how they contributed to cultural self-discovery, describe the circumstances of these events, and explain why they are important in

your life" (Cooper & Lilyea, 2022, p. 200). Highlighting the contribution to self-discovery is pivotal as Freeman (2012) points to how recalling experiences "is not the *purpose* of autobiographical memory; the purpose is rather to understand, to make sense of the past in light of the present." (p. 25). For me, these events included memorable science classroom lessons or activities. For example, I recalled a Grade 1 dental health lesson where a teacher's lack of cultural awareness led to feelings of othering when my naturally dark gums were labeled as unhealthy. This moment underscored how culturally unresponsive teaching can marginalize racialized students. I also reflected on the annual elementary school science fairs, which uniquely allowed me to merge my home and school worlds through collaboration with my mother. Additionally, I examined high school extracurriculars like science tutoring and chemistry competitions, which were often encouraged by teachers and counsellors as pathways to post-secondary success. Alongside this, I used external data such as photographs (e.g. class trip to science museum), awards/certificates (e.g. science fair ribbons, chemistry competition certificate), and report cards (specifically science marks and teacher comments) that helped "to determine timeframes and spark memories" (Cooper & Lilyea, 2022, p. 199). These artefacts were embedded directly into the self-reflective writing as a dialectic tool between my memory and sense-making. In other words, it was crucial to increase the rigor and trustworthiness of the data by allowing source triangulation between internal thoughts and memories with external artifacts. In summary, the data collection process involved collecting the external artifacts from my personal storage, using the artifacts to chronologically map (through grade level) major events and experiences, describe said events and experiences onto a living word document, and then finally revisiting the described events and experiences to reflexively contextualize the identity formation/negotiation moments.

Life story interviews were the second data collection method in this study to encourage participant engagement and offer robust data. The life story interviews itself were about one hour in length, via Microsoft Teams (to increase access to participants across the province), audio recorded, and semi-structured. Life story interviews offer particular benefits through their informal conversation style that allows the researcher and participants to establish trust and disrupt power dynamics that would otherwise inhibit participant openness (Ruslin et al., 2022). Informal conversations establish comfortable environments that evoke qualitative factors such as experiences, feelings, and reflection which are crucial to building context within the data (Ruslin et al., 2022). Additionally, the semi-structured format of the life story interviews uses open-ended questions to elicit stories not originally anticipated by the researcher. Important to note was the avoidance of "why" questions which can put participants in a position to theorize their experience rather than sharing, and to instead follow up using respondents' ordering and phrasing to evoke further details, if needed (Savin-Baden & Niekerk, 2007). The main purpose of using life story interviews was to centre the participants' voices. The interview is an opportunity to tell their story, the way they want, so that we can learn from their subjective perspective. As such, the power is in the story-teller's hands, and the researcher is the listener, encouraging but non-directive to responses (Atkinson, 2007).

In order to pursue the research questions of: (1) what are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling; and (2) how are Tamil-Canadian students' identities (re)shaped through their experiences within Ontario's K-12 science education, I used the following open-ended questions to guide the interview:

(1) Can you tell me about your childhood and about growing up in a Tamil family?

    (a) What was the cultural demographic like in your city?

(b) How did that impact you and your family (e.g. personal interests, cultural traditions, social circles, etc.)?

(c) How would you describe your family dynamic (e.g. roles, expectations, relationships, etc.)?

(2) Tell me about your memories of K-12 schooling. What was it like being a Tamil person in the Canadian school system?

(a) How was your Tamil culture included into your daily schooling (in-class, recess-time, lunch breaks, extra-curricular activities, etc.)?

(b) How did your peers/teachers/administrators/principal interact with you?

(c) What was your parents' involvement in your schooling?

(3) Tell me about your memories of science classes during K-12 schooling. For example, how would you describe your time learning science?

(4) What was it like being a Tamil person in your science classes? Did you feel as though your Tamil identity was honoured or reflected in your K-12 science experience?

(a) For instance, in textbooks or lessons?

(b) In non-graded activities like class discussions, guest presenters, or field trips?

(c) In graded activities like projects, labs, or tests?

(5) What made you pursue your major in your current undergraduate studies?

(a) How were you supported in your decision by your parents?

(b) How were you supported in your decision by your teachers?

(c) How were you supported in your decision by your peers/friends?

(6) Based on those experiences, what did being Tamil-Canadian in science mean to you as a child vs. now?

3.5 Data analysis

Data was collected in the form of the narrated lived experiences from the researcher's critical autobiographical writing and the life story interviews with the participants of the study. For the life story interviews, the audio recording was manually transcribed verbatim. The participants received their interview transcript to review and ensure their story portrayed their truth (Atkinson, 2007). Once member-checking was cleared for credibility, I engaged in the second phase of narrative inquiry: the response to the life stories. In this second phase, I applied a critical theoretical stance informed by my positionality to make meaning of the shared stories, with the outcome of re-constructing the stories into a collective narrative that identifies themes, issues, and connections centred around the research question. To do so, both the autobiographical writing and life story interview transcripts were read thoroughly. Next, inductive coding was applied (Saldana, 2009) through thematic analysis to allow the narrative to emerge on its own. Thematic analysis is a reflexive process that requires the researcher's subjective experiences to play a central role in making sense of the data (Braun & Clarke, 2006). In this study, my positionality as a Tamil-Canadian played a significant role in informing the interpretations of the data, particularly in identifying culturally resonant patterns related to familial expectations, educational pressures, and identity negotiation. For instance, a recurring theme among participants was the emphasis on academic achievement as a pathway to legitimacy and respect, something I personally experienced and recognized as part of a larger discourse of "credentialism" often prevalent in diasporic Tamil communities. This recognition allowed me to interpret participants' reflections on success and failure not just as personal experiences, but as part of broader socio-cultural narratives.

In addition, special attention to epiphanies and metaphors within the stories was applied as epiphanies are usually a transformational experience within the storied lives, and metaphors provide further insight into the researcher or participants' tacit assumptions (Savin-Baden & Niekerk, 2007). For example, one participant spoke about realizing that their drive to succeed in science was less rooted in personal passion and more in recognition that their academic success would generate social capital for their parents, enhancing the family's status within the Tamil-Canadian community and fulfilling broader communal expectations. This was an epiphany I also encountered in my own journey: that succeeding in science was not just about individual achievement but about contributing to the collective reputation and upward mobility of the family. On the other hand, a metaphor that was frequently used was "wearing a mask," which participants used to describe the performative aspects of navigating multiple figured worlds, in this case, acting differently in school versus at home. This metaphor powerfully captured the tensions of living between the norms of settler-colonial schooling and Tamil cultural values. As such, through a combination of culturally resonating experiences, epiphanies, and metaphors, thematic patterns emerged, with key recurring codes such as "pressures to succeed", "invisibility of Tamil identity in curriculum", "assimilating into settler-colonial norms", and "desire for cultural reclamation." These codes clustered into broader themes of science as credentialism and the fragmentation of Tamil identity in science education.

To deepen the analysis, I employed axial coding (Saldana, 2009) using a temporal mapping approach that traced experiences across a timeline: before, during, and after the science classroom. This approach helped to contextualize identity formation as a dynamic process, shaped through movement across multiple figured worlds (Holland et al., 1998), such as the figured world of the Tamil household and the figured world of school science. By mapping these

experiences temporally and spatially (Connelly & Clandinin, 1990), I was able to uncover how critical moments (e.g. a teacher questioning a student's choice, a family member discouraging a career in arts, or discovering a culturally relevant role model) influenced identity negotiation. Together, this process of thematic and axial coding enabled the development of a collective narrative that not only answered the research questions but also highlighted the nuanced and complex nature of ethnocultural identity negotiations within science education.

3.6 Ethical Considerations

As this research involves human participants, I first sought Research Ethics Board approval and then, required informed consent from the participants informing them of the purpose, benefits and risks involved in the study. The consent form highlighted the right of the participant to refuse to answer a question or end the interview when needed without any repercussions. As the researcher is Tamil-Canadian themselves, the participants can share their experiences in a space with mutual understanding, leading to lower risk of misinterpretations. However, to ensure the participants' narratives are accurately depicted, transcripts were shared for feedback.

Additionally, the consent form indicated assurance of anonymity and confidentiality to prevent the data being linked back to the participants (Mohd Arfin, 2018). Participants were able to select their own pseudonyms which was attached to their particular data in order to conceal privacy, and reputation-related situations (Mohd Arfin, 2018). Additionally, confidentiality was ensured through the safe storage of data onto the secured UM cloud service. Sharing data with participants was only done through UM cloud services via links with specifically designated access. The consent form also informed the participants that the data provided may be used outside of the university for educational purposes in journals, conferences and other publications

with their identity masked in the same way as the study.

There was the potential of mental distress to (re)emerge when speaking on personal experiences, especially if past triggering events were disclosed. However, most narrative inquiry studies indicated participants feeling liberated after sharing their stories due to greater self-knowledge, stronger self-image, and a purging of certain burdens that validate their personal experiences (Atkinson, 2007), a case that was widely reflected in this study as well.

Chapter 4. Findings as Living Stories

This chapter presents the findings of the study, drawing from the stories and reflections shared in my autobiographical writing and life story interviews with Tamil-Canadian participants. The findings are organized into two main parts, each aligned with a central research question. The first part includes a series of short narratives that provide insight into each of our broader lived experiences. These narratives explore family life, schooling backgrounds, and the cultural and social contexts that influenced our educational journeys. By grounding the analysis in our personal histories, this section begins to answer the first research question: *What are Tamil-Canadian university students' motivations for pursuing science during K–12 schooling?* The second part of the chapter shifts focus to explore our specific experiences within science classrooms. Here, the narratives dive deeper into how the Tamil-Canadian students in this study interacted with the subject matter, the pedagogical approaches they encountered, and the social dynamics of these learning environments. Through this lens, the section responds to the second research question: *How do the experiences within Ontario's K–12 science education (re)shape Tamil-Canadian students' identity?* Taken together, these two sections offer a holistic understanding of how we, the participants, come to, and move through, science education, while revealing the complex interplay between the figured world of home and the figured world of school science that impact the overall identity negotiation.

4.1 Tales between Two-Worlds

The following section presents a series of short, yet layered, narratives that delve into the lives of Tamil-Canadian participants as we move through and across different spaces of belonging. These narratives are organized around three key areas that provide the necessary context for understanding how Tamil-Canadians came to engage with science, and why. First,

each narrative begins by situating the individual within their home life, attending to family composition, sibling dynamics, and the socio-demographic characteristics of the cities or towns in which they were raised. These details help to illuminate the everyday structures and values that shaped our early understandings of identity, responsibility, and success. Second, the narratives examine our general experiences within the Canadian K–12 education system. As racialized students from immigrant families, Tamil-Canadians often encountered school spaces differently from their peers, navigating both spoken and unspoken expectations related to language, achievement, and cultural norms. These accounts surface the various supports, barriers, and informal guidance systems that influenced how Tamil-Canadian students accessed and made sense of schooling in Canada. Finally, each narrative considers each participant's relationship to their Tamil identity as it (re)shapes across both home and school contexts. This includes reflections on cultural values, parental aspirations, societal pressures, and the ways in which science entered their lives. Together, these narratives provide a textured and multifaceted response to the first research question: What are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling? By weaving together experiences of home, school, and identity, they offer insight into the complex forces, both personal and systemic, that shape Tamil-Canadian students' pathways into science.

4.1.1 Keeran: Tamil as a vehicle to knowing the Self

Keeran is a 22-year-old Tamil-Canadian, born and raised in a small city in southeastern Ontario. His parents immigrated to Canada from Sri Lanka independently from each other, eventually crossing paths in Montreal and building a life together in Ontario. Keeran's father fled Sri Lanka at the height of the Tamil genocide to secure safety and a future for himself. Keeran shared that, "the whole aspect of dying for something you care about, it opened [his own]

vision," which deepened his connection to his Tamil identity, one rooted in pride and a sense of justice for those who fought to preserve Tamil culture and language.

Keeran grew up in a household with his parents, four siblings, and, at times, extended family members such as his uncle and grandparents. It was common for his family to welcome relatives in times of need, fostering a tight-knit, supportive environment. Among his siblings, Keeran is the third. He has an older sister, an older brother, a younger brother, and a younger sister, making him the penultimate middle child. He observed his older siblings' experiences in school and used them as a guide, while still maintaining autonomy and forming his own identity through the choices he made.

Keeran described his home life as one where his "parents talk to [him] in Tamil." The family "watched Tamil movies and listened to Tamil music a lot" and shared traditional Tamil meals at the dining table. In his early years, Keeran recalled that "[he] spoke a lot of Tamil to the point that [he] wouldn't speak English at school," even though English was essential for navigating the Canadian education system. As a result, his parents encouraged more English at home, and Keeran eventually became so fluent that he started to excel academically. However, this shift came at a cost. He now struggles to express himself in Tamil, explaining, "I try to practise Tamil [myself], but I can't think of the words." His limited exposure to Tamil outside the home, where his town was predominantly white, his teachers were all white, and only two of his classmates were Tamil, only deepened this disconnect.

One area where Tamil remained relevant was through his practice of Islam. While he attended public Catholic schools, Keeran noted, "if [he] were ever cognizant of [his] identity, it would probably be [his] religious identity." He often found himself debating religion with his peers, which sparked a desire to relearn his native language to better understand and represent his

faith. He felt this would equip him to counter misinformation shared by classmates. Tensions also arose with teachers, who sometimes imposed assumptions on him or others based on their Tamil or Muslim identities. He recalled one teacher questioning a Muslim student's decision not to participate in prayer, even after the student explained they did not practise the religion, responding, "if they don't do the prayer, then they should go to [the local secular high school]." Another teacher made a culturally insensitive joke, asking his older brother and a female Tamil friend, "when is your arranged marriage?" While clearly inappropriate, Keeran had grown used to such ignorance at school and often shrugged it off. In fact, he admitted to finding a kind of comfort in the predictability of the town's colonial mindset, describing it as "quiet here" compared to the more diverse metropolitan city he is in now.

Today, Keeran is in his fourth year of a Bachelor of Science in Health Sciences program. He initially pursued this path with the goal of becoming a doctor, motivated by his strong academic performance, especially in high school, and a belief that he could rise to any challenge. "I felt like I could literally do anything," he shared, explaining his choice of a prestigious and demanding career. His parents were thrilled, though they assured him they would be supportive "even if [he] didn't want to become a doctor," which eventually became the case. Keeran explained that University had humbled him, and he realized he did not need to be the smartest person in the room. As his original motivation for medicine began to dissolve, he was able to reflect more deeply on what he truly wanted. Now, Keeran aspires to become a science teacher, committed to helping students learn through understanding rather than rote memorization. He also hopes to engage in his own learning journey: "Now I feel like Tamil is so important to me, I want to learn it."

4.1.2 Janani: A majority in a minority community

Janani has spent all 18 years of her life growing up in the Greater Toronto Area, home to the largest Tamil diaspora in Canada. She describes no shortage of exposure to the Tamil language and culture, having been surrounded by local Tamil supermarkets, Hindu temples, and Tamil neighbours. The community was so large that Janani identified as part of a subgroup called "Upcountry Tamil," also known as the Indian Tamils of Sri Lanka. This group hosted events such as barbecues, which she used to attend frequently but eventually distanced herself from due to negative experiences within her Tamil friend group. Janani described how the group felt "cliquey," noting how common it was that "if you tell person A something... you would expect person B and Z to know about it," highlighting a toxic gossip culture she no longer wished to be part of. Her avoidance of Tamil peers extended beyond these community gatherings and into her school life as well. For example, Janani recalled having to choose a cultural dance team to join for her high school's multicultural showcase. She explained that she "personally did not partake in Team Tamil only because of the drama... [she] didn't know who to trust" and instead chose to join Team Pakistan.

Janani's educational journey involved attending a number of different schools. She began in a Montessori school from kindergarten to Grade 3, which she described as having very few Tamil students. During this period, she did not recall any strong connection to her Tamil identity, not even through food, as meals were provided by the school. From Grades 4 to 8, she attended a private Indian school with a predominantly South Asian student body. During these years, she felt more comfortable bringing Tamil food to school and talking about her weekend temple visits, since these activities were common in her peers' lives as well. She later transitioned to a public high school, where there were still a significant Tamil population and several teachers of

colour, although none were Tamil. Janani shared that she felt most connected to her Tamil identity in high school, particularly through her involvement in the Tamil Student Association (TSA). She recalled a memorable experience that revealed how the school administration perceived Tamil students. In May, a month significant to Tamil-Canadians for commemorating the Mullivaikkal Massacre—the mass killing of tens of thousands of Sri Lankan Tamils in 2009—the TSA had prepared an assembly presentation. The students focused on explaining what happened during the civil war, why May holds significance, and the purpose of the TSA itself. However, the principal deemed the assembly too political and did not allow it to proceed. Janani felt that the TSA's teacher liaison was not as communicative or supportive as the students had hoped and could have advocated more strongly on their behalf. She compared this experience to those of the Black Student Association and the Muslim Student Association, both of which had assemblies with content related to war and injustice that were approved by the same principal that year. This incident motivated Janani to volunteer with a Tamil Member of Parliament in her riding, who at the time was working on a bill to recognize Tamil Genocide Week, with the aim of integrating the topic into school discussions.

Janani's home life is relatively small compared to the other participants, as she is an only child living with her mother and father. She mentioned having much older half-siblings, though they never lived in the same household or attended the same schools. At home, Janani's engagement with her Tamil identity is expressed through her Hindu religious practices. Her daily routines include morning prayers, lighting ghee lamps, and applying a religious marking to her forehead. These acts serve as intimate reflections of her cultural and spiritual identity. Janani also began questioning the gendered roles in her household, noticing that her mother and she were responsible for all the chores while her father did not contribute, asking herself, "Why doesn't

my dad do anything?" She wondered whether these gender roles were influenced by Tamil cultural norms.

Both of Janani's parents were born and raised in Sri Lanka and had no experience with the Canadian school system or post-secondary education. Janani described her parents' involvement in her education, especially her mother's, as consistent and supportive. Her parents attended parent-teacher interviews, volunteered for school trips, and regularly checked her report cards. She noted that "they were more concerned with the comments than the grades." As a result, Janani felt no pressure to pursue any specific career path and appreciated the freedom to explore her own interests. She is currently in her first year of a Bachelor of Science in Psychology, aspiring to become a psychologist. She shared that she enjoys working with people and learning about them and alongside them. Interestingly, Janani admitted, "I never saw myself as someone into life science." She had also received offers to study psychology through a Bachelor of Arts program at several universities. During her decision-making process, she was influenced by the opinions of both family and friends. Her father remarked that "in Sri Lanka, they see a Bachelor of Arts [as] not good, because they think you're just dumb," which made her hesitate. A friend encouraged her to choose science first, saying she could always switch to the arts later. Taking this advice to heart, Janani enrolled in the Bachelor of Science program and is preparing to enter her second year this fall 2025.

4.1.3 Surya: A desire to disrupt neutrality

With Tamil roots and an Ottawa upbringing, 22-year-old Surya describes feeling a distinct divide between his home culture and the world outside. While he engaged with his minority identity through food, religion, and entertainment, he shared that his "interests aligned more with white culture... a product of growing up here" in Canada. His parents, who

immigrated from both India and Sri Lanka, struggled to understand his preference for participating in what they saw as "Western" ways of being, creating a disconnect in their relationship. Surya recalled his parents' communication style as more rigid: "Do this, do that," which made it difficult for him to understand why they insisted on doing things the Tamil way. However, his four siblings, who were also raised in Ottawa, shared similar feelings about fitting into settler-colonial culture, which helped create a close-knit bond between them through shared experiences.

At home, Surya lives with his parents, four siblings (he is the second youngest), and his grandmother. Tamil is spoken in the household, mostly by his parents and grandmother, but Surya explained that he can only comfortably respond in English, despite being able to comprehend Tamil. This language barrier developed largely because English was necessary for communication outside the home, particularly at school, and so it became more frequently practised.

In school, Surya described classrooms filled with students from many different ethnic backgrounds, reflective of Ottawa's diversity. However, he noted a clear absence of a Tamil community. Despite this, he never felt excluded or isolated within his school's social circles. He recounted bringing Tamil food for lunch and how his friends reacted with "curiosity" rather than indifference. This curiosity was significant to Surya, as it "made [him] more inclined to answer" and share aspects of his Tamil identity with others. While his peers were inquisitive, his teachers appeared more indifferent. Surya shared, "They didn't see me as a Tamil kid. They just saw me as their student." He described feeling "pretty neutral" about his teachers not acknowledging his ethnic identity. When asked whether his Tamil identity was ever reflected in the classroom, he responded, "I wouldn't say that was the case, but not necessarily in a negative way." His

reflections raise questions about the normalization of a silenced minority identity.

Surya is now in his final year of a Bachelor of Information Technology (IT) program. His interest in the field began in high school after taking a computer science elective. He recalled a guest presenter in the game development field whose talk inspired him to consider a career in game development. Surya was accepted into a game development program at his local college but was ultimately persuaded to pursue IT instead. The main influence behind this decision was his family. He explained that his parents held what he referred to as the "Tamil parent mindset," which valued university over college due to perceived prestige. Feeling disconnected from his parents' expectations, Surya turned to his older siblings for advice, particularly his brother who already worked in the computer science field. His brother advised that it would be easier to start in a university program and switch to college later if needed, rather than the other way around. Surya followed this advice and remained in the IT program.

When asked how he felt about not pursuing his original passion, Surya said he "felt kind of neutral about it." This neutrality, he realized, mirrored how he had often navigated his identity while growing up. Now, Surya is actively working to challenge this pattern. "I just have this desire to be more in touch with the culture because I spent most of my life leaning in on white culture. And so, now I'm just trying to go back to the Tamil culture... there's a lot more pride in that sentence." His journey back to his cultural roots begins with small steps, such as wearing traditional Tamil jewellery. By making his cultural identity more visible externally, Surya hopes to strengthen and sustain his internal connection to being Tamil.

4.1.4. Nila: Fulfilling the generational dream

25-year-old Nila is the eldest sister of our previous participant described above, Surya, and like her brother, she was born and raised in the diverse Ottawa region. Despite growing up in

the same family, Nila describes having experiences that differ from Surya's, as well as from those of her other siblings. As the eldest daughter, Nila was expected to navigate a distinct set of responsibilities and limitations. She recalled a "very restricted" upbringing that involved only going to school and returning directly home, with little to no social life. She was not permitted to spend time with friends, a restriction she attributes to gender norms within Tamil culture: "'Oh he's a man, it's okay for him to be free, do his own thing,' and I'm supposed to be at home." This was in reference to her older brother being allowed to travel with friends while she was denied the same opportunity.

Nila also described the financial responsibilities she carries. "I'm paying a lot of bills at the house. I would say 90% of my income goes towards bills." She compared this with her younger sister, who contributes financially but only "maybe about 25%... the rest she keeps and can spend on her own." Additionally, Nila supports her family by caring for her grandmother, drawing on her experience as a part-time pharmacy assistant. This includes managing prescriptions and diet, which requires a strong command of the Tamil language, as her grandmother speaks only Tamil. As a result, Nila describes herself as the most proficient Tamil speaker among her siblings, though she stops short of calling herself fluent.

While Nila bears these responsibilities, she acknowledges that her older brother also faces distinct expectations, such as being emotionally supportive of their mother. "He's responsible emotionally in terms of supporting my mom." This emotional role places him as the primary communicator between the parents and the rest of the siblings, often leaving Nila and her younger siblings out of key family discussions. Still, Nila highlights that her relationship with her siblings is incredibly close, a sentiment echoed by Surya. She credits this to their parents' philosophy: "your siblings are your best friends." Each sibling may face different

expectations, but they work together to bridge the gaps between their experiences.

In school, Nila explains that the social restrictions placed on her led to a personality that was "very shy [and] introverted." She felt like an outsider, which contrasted with Surya's experience of acceptance. When she brought Tamil food to school, her peers responded with rudeness rather than curiosity, making comments like "what smells" and "that looks weird." As a result, Nila gravitated toward peers who were similar to her in personality. Her mother encouraged this by warning Nila that she "worried [she] would be influenced by other groups" and advised her to connect with other Tamil students. However, since there were few Tamil students in her classes, Nila found common ground with her Muslim classmates, who she felt shared "the same principles in their religion and culture." Within this group, Nila felt understood, especially when it came to explaining her parents' expectations or her own reserved nature.

Regarding her experience with teachers, Nila said, "I didn't notice much difference in how I was treated versus how others were treated." However, she admitted that her introverted nature made her "hesitant to ask questions when [she] did have them," resulting in her trying to navigate school largely on her own. She acknowledged that her limited engagement with teachers may have prevented her from noticing how she was perceived or treated, as she "never quite put [herself] out there in the classroom."

Today, Nila has just completed her Bachelor of Science in Biochemistry, a seven-year academic journey that included transferring universities to return to Ottawa and be closer to her family. Nila chose biochemistry with the ultimate goal of becoming a doctor and is now applying to medical school. Her motivation for pursuing medicine is layered. The first reason is tied to a generational dream: her father once enrolled in medical school in the United States, supported financially by Nila's grandmother, who deeply wished for him to become a doctor. However,

with Nila's mother alone in Canada and expecting their first child, her father ultimately left medical school to support the family. That dream, though abandoned, was never forgotten. Her father's dream resurfaced in Nila's life, especially after her older brother pursued computer science instead.

Nila explained that she wanted "to make [her parents] proud" and carry forward the dream. She felt additional pressure when hearing comparisons to her cousins in India who did not qualify for medical school. This pressure was amplified by comments like, "you'll be the only one in this generation" and "we have a doctor in the family." Still, Nila's motivation is not solely based on family expectations. Her time as a pharmacy assistant gave her firsthand insight into the challenges patients face. She shared, "I see the struggle that patients go through, especially without a family physician and their health conditions. I see how doctors play a big role in not only diagnosing and treating but also being their support system." These dual influences, honouring a generational legacy and a genuine desire to support others, now fuel Nila's determination to become a doctor.

4.1.5. Puvithira: The all-in-one people pleaser

Although I was born in Montreal, I completed all my schooling in a small eastern Ontario township. I lived with both my Amma and Appa, as well as my older brother and younger sister, making me the middle child. However, I never identified with the middle child label; instead, I felt more aligned with the eldest daughter role. Some of the responsibilities that came with being the eldest daughter included being a role model for my younger sister by following many of the rules my parents set, especially those for girls. This meant dressing modestly by never revealing skin (e.g. wearing long pants and long-sleeved shirts, even in the hot summer). I wasn't allowed to wear my hair down or wear any makeup, as these were seen as signs of allure. I was also

expected to be very docile and quiet. For example, I wasn't allowed to ask questions or be curious, because those were considered adult ways of thinking. I was to trust my parents had my best interest in mind until I needed to navigate the world on my own (after high school). Meanwhile, my brother was not obliged to these rules, and so he dressed, spoke, and behaved as freely as he wished.

Growing up, my Amma was very adamant about us retaining our Tamil language and culture. She must have noticed us adopting more colonial ways, from how we talked to shifts in our attitudes and values. So early on, she set a rule that we only speak Tamil at home. This later extended to only listening to Tamil music and watching Tamil TV shows, though that became difficult to enforce with the rise of the internet. My parents also encouraged us to take extracurriculars rooted in Tamil culture, especially music. Every Sunday, we traveled to Montreal, where there was a larger Tamil community, and enrolled in a traditional South Indian Carnatic music program that included vocal, violin, dance, and piano lessons. These classes not only exposed us to Tamil music and its history but also gave us a Tamil-dominant space filled with people like us. The household rule to speak Tamil, combined with the Sunday Tamil community, made us more fluent in the language and culture compared to my Tamil peers who grew up in Cornwall.

At school, I didn't really let my Tamil identity show. I quickly realized I stood out in a sea of mostly white teachers and students. At first, it didn't bother me because my peers didn't make a fuss. But over time, comments started to emerge. For example, during a school blackout, a student pointed at me and said, "Puvi disappeared," implying my dark skin blended into the darkness. The class laughed, and I forced myself to laugh too, secretly wishing I had lighter skin. I also remember coming to school with Hindu markings on my forehead from daily prayers.

Since my schooling was in the Catholic system, students didn't understand these marks, never asked about them, and called them "dirt" on my face. After that, I never wore the markings again. Though my Amma insisted I do the prayers, I would wipe off the marks on the walk to school, telling her they had faded while playing recess so I wouldn't get questioned.

Most of my friends were white, reflecting the school's demographics. My Amma pushed me to befriend the one Tamil classmate I had, and we eventually grew close. My Amma didn't like when I came home asking to go to the mall, buy a One Direction album, or questioning why I couldn't hang out with my friends after school. She worried my white friends were influencing me to become more Western. This created tension in my social life, though my friends were patient and tried to accommodate me, sneaking around my Amma so I could join activities.

Academically, school came easily to me. I was always a top achiever, and my parents had high expectations, insisting school come first. This made it hard for me to discover what I truly enjoyed because I had to excel at everything. My teachers never encouraged me to pursue specific interests since my academic success gave them no reason for concern. I felt good about that, good that no one worried about me. Not my parents, teachers, siblings, or friends. I made it easy for everyone by adjusting how I presented myself: to my parents, the well-behaved, obedient Tamil girl; to my teachers, the quiet, smart student; to my friends, the easy-going pop music expert; and to my siblings, the reliable mediator between them and my parents. In essence, I became a people-pleaser, which made it difficult to understand who I really was, until I moved out and lived in a more diverse city. There, I began to see value in both my Tamil and Canadian identities and now proudly negotiate space for both.

4.2 Tamil-Canadians' Scientific Selves

The preluding narratives provide context of whose stories are weaved into understanding

the experiences of Tamil-Canadians in Ontario's K-12 science classrooms. They speak to our broader journeys: how we came to study science, the environment that shaped our interests, and the challenges we have encountered along the way in our K-12 schooling. But to truly contextualize the quality of our time spent within science, we need to trace the experiences that happen before, during, and after engaging in that space. As explained earlier in the literature, identity can be seen as flexible through their movement within and between the various figured worlds society constructs. For this particular study, it is important to consider the figured world of the Tamil-Canadian's home life in relation to the figured world of school science. What set of values from the figured world of our home are us Tamil-Canadian's carrying into the figure world of school science? How are these values impacted by the people and culture that make up our figured world of home? Do the values from the figured world of homework with or against the values within the figured world of school science? Finally, what goals do we walk out of the science classroom with, based on the relationships between the values of both figured worlds we inhabit?

4.2.1 Before the classroom: Perfect Grades, Professional Career

The earlier narratives provide some insight into how the figured world of home plays a significant role in shaping our Tamil identity. But how well does that minority identity translate into the figured world of school science?

Like many other Canadian students, nearly all participants in this study live(d) with their parents and siblings. But particularly unique was the sibling dynamic—and more specifically, birth order—playing a significant role in how we navigated school. Some of us are the oldest and the first in our family to attend Canadian schools, and as such, had to navigate the system through trial and error. We essentially created a cheat sheet that we passed on to our siblings so

they could avoid the barriers we had to stumble through. Others in the study are either the middle or youngest child and used this cheat sheet from older sibling(s) as a way to save time figuring out how school worked, allowing them instead to focus on what they wanted to do in school. This relationship between siblings was recognized by parents. As Surya explained, “if I needed homework help, for example, they’d leave that to my older siblings to help me with that and teach me.”

All of the Tamil participants in this study are first-generation Canadians, children of immigrants, whose parents arrived after completing their schooling in their home countries. Most of our parents had no experience with the Canadian education system, and many had not experienced post-secondary education at all, even in their countries of birth. As a result, they relied on broader societal expectations to guide their children’s academic success and future careers. The advice many parents gave was simple: ensure academic success to get into higher education. Higher education, specifically university, was the "big goal" encouraged by many of our parents, as it was seen as a gateway to secure, respected professions like doctors and engineers, which they believed would ensure success in their new society.

Canadian (and more broadly, colonial) schooling quantifies student success through final numerical grades (DeLuca et al., 2017). While there have been attempts to shift toward progressive feedback, grades still hold significant weight in determining access to post-secondary opportunities (DeLuca et al., 2017). There are alternative paths into post-secondary, such as athletic scholarships, but these are rare and require substantial financial investment in training and resources, something not always accessible to immigrant families. Therefore, academic achievement remains the most viable path to success.

For many of us, how we achieved high grades was not the focus for our parents, only that

we achieved them. As Surya mentioned, “they only looked at [the behaviour comments on the report card] when the grades didn’t satisfy them.” If we excelled on our own, our parents trusted us to continue doing so. If we struggled, they acted quickly, asking an elder sibling to help, as in Surya’s case, or “sent [us] to tutoring,” as Janani recalled. What mattered most was achieving perfect grades. This sentiment was universal among us. For example, Surya shared that his mother looked for “a lot of A's across the board” on his report card. Kieran recounted scoring a 74 on his first biology test: “I was so heartbroken and like, ‘oh my gosh, my mom’s gonna kill me’.” My own experience was similar. I remember receiving a 60 on a science assignment and crying outside my locker, afraid I had disappointed my parents. One phrase from my Amma still echoes in my mind: if I brought home a 95%, she would ask, “Where’s the other 5%?” The grade always had to be perfect.

This constant pressure to achieve high marks across all subjects creates a highly competitive environment for us, especially among each other. Not only is it important to get high grades, but being the highest achiever becomes another goal, often reinforced by parents. As noted in the literature, immigrant parents often lose their social capital when relocating to a new country (Desai & Subramaniam, 2003). Their child’s academic success, particularly being the top student, becomes a point of pride and a way to rebuild that lost capital. When a child is praised for being at the top, it becomes an extrinsic motivation to continually meet those expectations.

Janani described how this competitiveness made her feel distant from science learning. Not only did she feel pressured to perform well, but she was surrounded by classmates under the same pressure.

> Whenever it came to science, it felt like a big competition…Every parent is putting pressure on their kid, like "do better, do better, do better." And that really reflected on my classmates work as they would do pretty good or either be really stressed out. One of my friends, I remember her not sleeping as much in Grade 8, just over the Science Fair project. The grade 8 teacher got concerned and called her mom in.

Science learning became an obstacle in the sense that the experience was no longer about shared learning, it became about individual recognition. I remember the science fair being a particularly stressful time. I once enjoyed being creative with projects and exploring topics that sparked my curiosity. But that changed once my Amma realized the projects were ranked. The year I won, it was because I followed a topic I wasn't even interested in, guided heavily by a tutor hired specifically for the project. While I felt a moment of validation in winning, every year after that I was no longer allowed to pursue my own ideas. I was to follow a rigorous blueprint set by the tutor that ensured a win. I did place again in subsequent years, but my love for the science fair quickly faded.

Our teachers seemed unaware of the pressure we carried. Worse, the pressure was often molded into a stereotype that we were naturally gifted in math and science. Because of our high academic performance, teachers often did not check in with us. Nila's experience was an exception. She recalled two instances where her teachers recognized the pressure, despite her strong performance:

> I remember one teacher in particular. She was telling me, "Even if you don't become a doctor, you can always pursue what you want. You can change down the line. And you don't necessarily have to do what your parents want" ...And that reminds me of another

> teacher. He specifically told me, "I know in your culture they kind of push you to do certain things, but you're very smart. You can do anything you want."

Nila's experience offers hope that some teachers are becoming aware of the cultural norms influencing their students. Perhaps her teachers' awareness stemmed from working with a diverse student population in Ottawa. In contrast, my predominantly white high school lacked this cultural understanding. In my senior year, I was advised to pursue a career based on what others thought I was best suited for, the sciences.

At that point, I had discovered a deep creative side. I had taken an art elective and found drawing to be a peaceful and fulfilling experience, so different from the race-to-the-answer pace of science. I became interested in architecture, a field that blended design and science in a way that excited me. But when I brought this idea to my guidance counselor, I was dismissed. I was told it would be a mistake and that I should focus on becoming a doctor instead of a forgotten architect. With so few adults to turn to for post-secondary advice, I internalized those words and continued pursuing medicine, only to fail at it anyway.

The covert nature of the model minority myth (Wang, 2008), when assumed by teachers, reinforces the pressure and competitiveness imposed by our parents. Without a trusted adult checking in, like in Nila's case, we felt we had no choice but to succeed in the science classroom. But what does it mean to succeed in science? Science education is embedded with Eurocentric ideologies. The content is colonial in nature, and Tamil-Canadian students often absorb it without critique. In doing so, we are able to regurgitate that content effectively during assessments, which favor demonstrating science through a colonial lens, and achieve the grades we so desperately want. But what is the cost of this unquestioned absorption of colonial values? What does it mean for our understanding, and erasure, of our own Tamil science knowledge?

4.2.2. During the classroom: Objective answers or Subjective truths

With the pressure to succeed in science classrooms by obtaining perfect grades, we were often positioned to internalize the content and values embedded in Ontario's science curriculum. As mentioned earlier, science education is based on MWS (Aikenhead, 2006a; Anderson et al., 2021; Higgins 2014), and as such, its settler-colonial perspectives risk transforming us into colonial bodies themselves. This issue is intensified by the way MWS is presented: it centres itself as a singular truth, often promoted as a universal truth (Held, 2023). Science is taught as objective, as right or wrong, a binary framework. MWS does not allow room for pluralistic thinking, for multiple ways of knowing that can lead to the same conclusions.

Many of us in this study have come to appreciate this clarity and the single-answer structure because it offers a higher chance of achieving strong grades, so long as we know that one right answer. For example, Nila shared, "Science, I feel like just made sense to me in a way, because there were rules to follow. For example, you know the reaction, you know what the product is going to be." This stands in contrast to Janani's experience. She explained that she prefers the opportunity to explain her thinking: "I just write and write and write, knowing something on there would make sense. But when I'm asked a multiple-choice question, I don't do as well when it comes to science." Science assessments often rely on multiple choice questions that reinforce the idea of right and wrong. However, these offer no space for contextual or partial understanding, emphasizing outcomes over the learning process.

For Keeran, it took struggling in university-level science courses to realize that truly connecting with science requires a focus on the learning process itself. He mentioned, "When I was in grade 10, it was like memorization. I was very good at memorization. Now, you just have to make it common sense. That's the whole goal that I use for studying." Educational research

has long emphasized the importance of allowing students to make meaning of what they learn, to make it "common sense." This often involves connecting learning to everyday life. For us, that second-nature aspect is our figured world of Tamil home life. Yet science, as a singular colonial truth, leaves no room for these minority ways of knowing, asserting dominance in the classroom.

The impact of science's objective framing is clear in Surya's view of the science he encountered at home. Videos his father shared about natural remedies were dismissed by him as "conspiracy videos," invalidating their knowledge systems entirely. Similarly, Keeran shared that when his parents gave him an onion and honey drink, a cold remedy passed down from his father's side, he rejected it, saying, "I don't want this. This is fake because it tastes bad." When asked if he would recommend his family's remedies to non-Tamil friends, he immediately replied, "Tylenol," expressing greater trust in pharmaceutical medicine informed by MWS.

One participant, Nila, offered a more nuanced perspective on the tensions between modern and traditional medicine systems, especially through her work as a pharmacy assistant. She has encountered people from many cultural backgrounds asking about which type of medicine to rely on:

> I see a lot of people coming in with those questions and I think it really depends on who the pharmacist is who's answering the question. I can think of one pharmacist in particular. He had a Middle Eastern background. He very much pushes for the holistic and we've talked about it a little bit. I feel like medicine should be a mix of both, because the holistic has years of use, years of like I almost want say research, because so many people have used it. It's well studied through our tradition or culture.

Through her work, Nila has come to understand that there are multiple approaches to health sciences, and one does not need to be replaced in order to engage with the other. She describes

how combining the holistic nature of traditional medicine with the targeted approach of modern medicine can lead to a more comprehensive outcome. Unfortunately, such experiences are not offered in school settings, and Nila only came to this understanding in adulthood.

One alarming commonality among all Tamil participants in this study is that none of us were ever given the opportunity to explore science through a Tamil lens. At no point were we taught by Tamil educators, taught about Tamil scientists, or shown how the science curriculum connects with life at home. This is interesting, considering that science is present in our daily lives, even if we did not always recognize it. Every participant, including myself, spoke about how food is one of our main ties to Tamil culture. But have we ever considered the science behind Tamil cooking?

For example, buttermilk is often served with rice and curry dishes. This fermented dish contains gut-friendly bacteria that support digestion (Sritheran, 2025). Food is often slow cooked in a kalchatti (stone pot) to enhance flavour and then transferred to a man panai (clay pot), which retains heat evenly (Sritheran, 2025). Even the order in which food is arranged on a traditional banana leaf, from lighter to richer dishes, is designed to aid digestion (Baskaran, 1984). Tamil science is also reflected in yoga practices that promote mobility and wellness (Wittich, 2022), as well as in agricultural knowledge passed down through generations, especially among Tamil communities in South Asia who continue to farm today (Nandhini et al., 2016). Yet, because this knowledge is not produced through the Western scientific method, it is often dismissed. Tamil science is deeply relational, rooted in spirituality and community. These values have no place in the objective, value-free worldview of MWS.

As a result, despite our engagement with Tamil science, we have never seen it as belonging in the figured world of school science. This was evident in our discussions, where no

one could initially identify or describe Tamil science in their everyday lives, even though it was clearly present. When I introduced examples of Tamil science, all participants recognized them, yet admitted they had never considered them "science." This highlights how the dominant framework of settler-colonial science has effectively erased Tamil knowledge systems. The influence is so strong that no one in the study, aside from myself years after graduating, had ever sought out the contributions of Tamil scientists.

If I were to explain this, I would suggest that it is because exploring Tamil contributions felt like a side quest in our science education. And it was a quest we simply could not afford. We were too busy chasing perfect grades. We did not need to know about Tamil scientists, or any scientists of colour, to succeed in school. Our priority was to learn the content we were taught. And that content, by design, is colonial. There has never been an opportunity or moment where the Tamil identity was acknowledged in our science learning experience.

4.2.3. After the classroom: Science as a credential rather than curiosity

A combination of not having opportunities to bring Tamil identity into school learning (whether through curriculum, pedagogical practice, or assessments) combined with our own internalized belief that our Tamil identity holds little or no value in the science classroom, creates a problematic and limiting one-way path into the figured world of school science. This path mirrors the concerns raised in Aikenhead's (1996) concept of cultural border crossing, which warns of the risks involved when students are expected to enter a dominant culture with no opportunity to return back to their minority figured world (Higgins, 2014). For many of us in the study, school science and home life are seen as entirely separate, even mutually exclusive domains. This rigid division is not just externally imposed by the structure of schooling, but also internally accepted and rarely questioned. At the time, during our own schooling experiences, we

did not see any meaningful overlap between these two figured worlds. We accepted the idea that science was something we learned in school and that our identities, cultural knowledge, and lived experiences had no role to play within it.

This perceived division was consistently reflected in the voices of nearly all the participants in this study. For instance, Keeran plainly stated, “they're two different areas” (Line 664), referring to the split between his identity at home and the one he brought into the science classroom. Similarly, Janani reflected on how she had never been encouraged to think about the two spaces together, saying, “science is more like facts, more objective than subjective… it's not like [she] doesn't see the two worlds together, it's just [she] never really thought about the two worlds together.” Her use of the phrase “never really thought about” points to the lack of opportunity or invitation within the school context to bring her whole self into the learning process. The idea that science is purely objective and devoid of personal or cultural influence further deepens the divide, making the classroom feel like a space where Tamil identities must be left at the door. Removing the self from the equation removes subjectivity from science, and yet in real life, science is inherently shaped by human experience. It is through our unique perspectives, influenced by culture, values, and worldviews, that we come to make sense of scientific phenomena. To assume that science is entirely objective ignores the reality that the ways in which we approach, conduct, and interpret science are deeply entangled with social and historical contexts.

In addition to this division imposed by the educational system, many of us carry forms of internalized oppression that further inhibit the inclusion of our cultural identity in science learning. Surya, for instance, admitted, “I didn't really let the Tamil identity influence how I thought about science.” The use of the word “let” is significant. It implies that Surya believed he

had a choice, or even control, over whether his Tamil identity would be relevant in the science classroom. But this perception also reveals that he did not see his cultural background as something that could enhance or contribute to his understanding of science. Instead, it was something to be compartmentalized. The suggestion here is that Tamil identity and science are incompatible, a belief likely shaped by years of implicit and explicit messaging within the school system. When students internalize the idea that who they are is irrelevant to what they are learning, they begin to distance themselves from the content, even when it might intersect with their lived experiences.

Nila, one of the older participants in the study who had the benefit of time and distance to reflect on these experiences, shared how her awareness of Tamil contributions to science came much later in life. She said:

> Most of the research, like most of the theories, are from white people. So, you see a lot of white names in the textbook, and it's usually a white man who was teaching me. So, there was that level of "oh, okay." But now in university, I'm seeing all the different people who have discovered different things. I'm seeing all these names and it's like, "so Tamils do make research and advancements." I feel like I can connect with that because eventually, if I don't get into medical school, that is a path I want to travel down, the research. So, seeing that in university versus in elementary school, where it's always the white people, it's a little off putting, I remember.

Nila's reflection highlights the impact that representation (or lack thereof) has on students' sense of belonging in a field like science. When Tamil names and faces are absent from textbooks and classrooms, it subtly reinforces the idea that Tamils do not contribute to science or that their contributions are not as valued. For Nila, it was not until university that she began to see Tamil

researchers being recognized. This changed her perception and gave her a sense of connection and possibility. When she now encounters Tamil names in academic journals or research studies, she pays closer attention, knowing the amount of work and perseverance it must have taken for those individuals to gain recognition. It also opened up new possibilities for her own future, including pursuing a career in research. This visibility provided a kind of permission to imagine herself as someone who could meaningfully participate in science.

I can relate to Nila's experience. For a long time, I could not see how my Tamil identity had anything to do with science. It was not until my final year of a Bachelor of Science program, when I was involved in a research study as a pre-service teacher, that I began to see science in my everyday life. I was asked to explore how science related to what I did at home, and I struggled at first to make any connections. Then, I thought about gardening with my mother. She had taught me techniques passed down from generations in Sri Lanka: how to prepare the soil, time the planting, recognize pests, and promote growth without chemicals. These were scientific practices rooted in lived experience and environmental knowledge. But school had never framed such experiences as science, likely because they happened outside of a lab or classroom. The science I had been taught was narrowly defined, often disconnected from culture, family, and community.

This disconnect shapes how we, as Tamil-Canadian students, come to perceive science. Our shared experiences suggest that science was never offered to us as a field of curiosity or wonder, but rather as a means to an end. It was a subject that served a functional purpose—to meet the requirements for future academic and career paths. As a result, we often engaged with science not because we found it exciting or meaningful, but because it was a necessary credential. The joy of inquiry, discovery, and creativity was largely missing. For most of the

participants, science classes were taken in high school not out of passion, but because they were required for admission into competitive STEM programs like medicine, pharmacy, or engineering. Even if we enjoyed certain aspects, such as lab work or experiments, the overarching motivation was about grades and outcomes, not learning.

None of the participants mentioned taking science electives out of genuine interest or because they were fascinated by the subject. This lack of intrinsic motivation is concerning, especially for a subject like science that plays such a central role in shaping our understanding of the world. If students are only pursuing science to meet external goals, then they are less likely to engage deeply or meaningfully with the content. Furthermore, they are less likely to see themselves as potential scientists, innovators, or changemakers. Instead, science becomes another hoop to jump through, another box to check on the way to a "respectable" career.

By excluding students' figured world of home from the learning process, the education system fails to create spaces where Tamil-Canadian students (and others from historically marginalized communities) can fully engage with science. Without the opportunity to see ourselves in the curriculum, in the content, or in the people teaching it, we are left to navigate a discipline that feels foreign, rigid, and often indifferent to our realities. This erasure has consequences not only for how we learn but for how we see ourselves and what we believe we are capable of achieving.

Chapter 5. Unraveling Experience, Reimagining Belonging

This concluding chapter brings together the key findings of the study to offer a critical synthesis of our Tamil-Canadian experiences in Ontario's K–12 science education. Grounded in a narrative inquiry framework, and framed through the theoretical lenses of figured worlds (Holland et al., 1998), Critical Race Theory (Ladson-Billings, 1998), and decolonial thought (Tuck & Yang, 2012), the chapter aims to make sense of our lived experiences in light of broader social, cultural, and structural forces. This chapter is organized into two main sections: (1) Discussion, which examines the dominant themes that emerged from the data, and (2) Conclusion, which addresses the study's limitations, implications, and directions for future research.

The analysis is guided by two research questions:

(1) What are Tamil-Canadian university students' motivations for pursuing science during K-12 schooling?
(2) How are Tamil-Canadian students' identities (re)shaped through their experiences within Ontario's K-12 science education?

In response to the first question, findings suggest that we are often motivated to pursue science not primarily out of personal interest or curiosity, but because of science's symbolic and material value within our immigrant families and Tamil communities. Science is viewed as a reliable credential, one that promises upward mobility, economic security, and social capital. This instrumentalist view of science is deeply embedded within both our family expectations and the structure of Ontario's schooling system. Addressing the second question, the study reveals a pattern of identity fragmentation, whereby we felt compelled to compartmentalize our Tamil

cultural identities and our scientific academic identities. Ontario's science curriculum often present knowledge as neutral and universal, leaving little space for students to draw upon their lived experiences, ancestral knowledge, or spiritual worldviews. This disconnect produces a tension between home and school, self and subject, leading to feelings of alienation and disconnection. The following discussion section will unpack these findings to provide a deeper understanding around the implications of credentialism and identity fragmentation.

5.1 Discussions: Science as credentialism and the Fragmentation of Tamil Identity in Science Education

Having established that us Tamil-Canadian participants often pursued science not primarily out of personal curiosity but due to this perceived status as a secure and respectable pathway, the following discussion examines the structural and identity-based implication of this finding. The first part focuses on how science is framed through the logic of credentialism, a process through which academic success is measured by the accumulation of qualifications rather than the development of meaningful understanding. This section interrogates how credentialism constrains our engagement with science, reinforcing extrinsic motivation while narrowing the space for inquiry, creativity, or critical thought. Building on this, the second part of the discussion explores how the credentialist structure of science education contributes to a fragmentation of our Tamil identity. Within classrooms shaped by Eurocentric and colonial norms, students often suppress or separate aspects of their cultural knowledge and values. The analysis considers how this division reproduces colonial logics within science education, shaping students not only as learners, but as subjects conditioned to leave parts of themselves at the classroom door. Finally, a consideration of how science education might be reimagined as a

space for reclaiming identity through relational inquiry rather than assimilation and performance will be engaged with.

5.1.1. Credentialism and the Limits of Motivation

A central theme that emerged from both my experience and those of other participants is the instrumental framing of science as a means to social and economic mobility, rather than a pursuit driven by curiosity or personal interest. Science, in this context, is valued for its exchange value in the labour market, not its epistemic or transformative potential. This aligns with broader concerns raised in educational sociology about credentialism, defined by Collins (1979) as the inflation of educational requirements for employment and status, leading to a schooling system focused more on certification than learning. The drive toward credentialism produces a system in which learning is subordinated to performance, and the acquisition of credentials becomes the primary goal. For us Tamil-Canadian students, whose educational aspirations are often shaped by histories of migration, racialization, and diasporic precarity, science becomes a strategic tool to gain respectability and stability. This is not merely an individual choice but a structurally conditioned response to systemic exclusion. As Labaree (1997) argues, the "credential race" defines success not by mastery of content but by one's ability to advance through bureaucratic hurdles. In this sense, success in science is framed as a means of accumulating social capital for the family and community, particularly in immigrant context where education is seen as a protection against marginalization and economic insecurity.

This dynamic often leads students and their families to prioritize the most recognized and legitimized science courses such as those considered acceptable prerequisites for medicine, engineering, and other high-status professions. For example, Ontario's secondary school science curriculum includes courses such as SVN3E (Environmental Science) and SNC4E (Science,

Workplace Preparation), which present opportunities to explore multiple perspectives, including ethical, environmental, and social dimensions of science (Ontario Ministry of Education, 2008). These courses challenge the notion of science as objective, culturally neutral, and universally valid. However, these alternatives are not accepted by most universities as prerequisites for competitive professional programs. Despite some shifts in post-secondary admissions, like McMaster University's removal of specific science requirements for medical school (McMaster University, 2023), the dominant perception remains that only traditional science courses (e.g., SBI4U, SCH4U) offer legitimate pathways to success. This selective validation of science courses reflects what Tuck and Yang (2012) identify as a "settler move to innocence," where participation in colonial institutions like formal K-12 education is seen as morally neutral and even virtuous. In reality, this participation often demands assimilation into dominant epistemologies and the erasure of alternative ways of knowing. The rejection of culturally embedded science courses by universities and parents alike signals a deeper investment in credentialism as colonial logic, one that reaffirms what counts as "real" science and who qualifies as a legitimate learner. Students are encouraged to conform to dominant expectations, reinforcing settler colonial values while narrowing the space for decolonial and community-rooted engagements with science.

While this motivation to pursue traditional science pathways may reflect resilience and navigational capital (Yosso, 2005), it also carries significant pedagogical and psychological costs. When science is treated merely as a credential, the development of intrinsic motivation, a key component of meaningful learning (Deci & Ryan, 2000), is often stifled. This credentialist logic undermines the possibility of engaging science as a form of imagination, inquiry, or critical engagement, restricting leaners to the narrow confines of standardized performance. This

becomes particularly problematic in higher education, where success requires interdisciplinary thinking and self-directed inquiry, skills that are not nurtured within a credential-focused schooling environment. Bransford et al. (2000) describe this shift as the development of adaptive expertise, which demands more than rote memorization; it requires students to transfer and apply knowledge across unfamiliar contexts. In my own experience, I entered university believing that success in science depended on memorization and exam performance, methods that had previously served me well in high school. These strategies aligned with what Van der Meer (2011) critiques as the "external effects" of educational credentials, where the value of education is less about deep understanding and more about signalling competence. However, I soon found that university science required a different disposition: one that involved critical thinking, synthesis, and curiosity, all of which had been underdeveloped in my earlier schooling. This disconnect was mirrored in the experience of Keeran, a participant who described feeling lost in his early university science courses. Once considered a "top student," he found his prior strategies ineffective in the face of more abstract and conceptually demanding material. In the language of figured worlds (Holland et al., 1998), Keeran was forced to inhabit a new identity space—one that challenged his earlier sense of mastery and demanded a more exploratory and self-directed engagement with science. These narratives point to a broader misalignment between the figured worlds of K-12 and post-secondary science education. High school science, structured around rigid curricula and performance metrics, fosters a particular kind of student who excels at reproducing knowledge but may be unprepared for the interpretive, conceptual, and relational demands of higher education. For racialized and immigrant students, whose educational trajectories are intertwined with familial aspirations and communal expectations, this misalignment is not only academic but existential. It disrupts the identity shaped by years of

credential-chasing and forces an abrupt renegotiation of what it means to be a "successful" science student. Drawing on CRT (Ladson-Billings, 1998), this phenomenon reveals how educational systems operate as racialized sorting mechanisms, amplified by discourses of meritocracy yet embedded within structures that reproduce inequity. The credentialist framework is far from race-neutral. It intersects with colonial histories, capitalist priorities, and whiteness as power to maintain educational hierarchies while appearing fair and objective. In this context, our motivation to pursue science cannot be separated from the racialized, colonial, and capitalist forces that structure our educational experiences, limit our choices, and shape our imagined futures.

5.1.2. The Fragmentation of Tamil Identity and the Reproduction of Colonial Logic

The credentialist logics explored above not only shape how we engaged with science, but also profoundly influenced how we came to see ourselves as students, as Tamils, and as knowledge producers. The separation of cultural identity from academic identity reveals a deeper colonial logic embedded within the structure and culture of science education in Ontario. Drawing on Holland et al. (1998), these dynamics can be understood through the lens of figured worlds.

In this study, both participants and I recounted navigating between the figured world of home (shaped by Tamil language, religious spirituality, and collectivist ethics) and the figured world of school science (shaped by individualism, objectivity, and Western empiricism). These worlds were not only distinct but often in conflict, requiring us to inhibit different selves depending on the space. This strategy of compartmentalization, while often described as adaptive, is also a form of internalized colonialism. Rather than bridging these worlds or re-imagining science as inclusive of Tamil worldviews, we were often taught implicitly (or

explicitly) that our cultural identities had to be silenced in order to succeed in science. As Dei at al. (2022) highlight, colonial education works not only by controlling what is taught, but also by shaping who learners believe they can be. It disciplines students into becoming alienated subjects, divided from their histories, communities, and alternative epistemologies. This fragmentation was something we felt deeply. At home, our identities were nurtured through family stories about surviving displacement, resisting colonial rule, and valuing community interdependence. In school, however, we felt pressured to "speak science" in a way that was sterile, objective, and depersonalized. We rarely felt that there were room for our stories in the curriculum. So, we became fluent in the language of neutrality, not realizing at the time that this so-called neutrality was deeply ideological.

The narratives show how Tamil identity becomes fragmented through a system that rewards what Tuck and Gaztambide-Fernadez (2013) call "settler futurity," the promise of safety, legitimacy, and belonging, but only through assimilation into dominant ways of knowing. In order to be seen as legitimate science students, we often downplay or detach from cultural ways of thinking and relating to the world. The system implicitly tells us that there is no place for Tamilness in science, unless it is hidden, sanitized, or left at the door. In this way, the schooling system sustains colonized bodies, not just through curricular exclusion, but through the internalization of epistemic inferiority. Ladson-Billing (1998) reveals through CRT how even well-intentioned educational institutions function as racialized and colonial sites, reinforcing the dominance of Eurocentric knowledge under the guise of meritocracy and universality. We become successful only by performing an identity that is palatable to whiteness and compliant with colonial norms of science.

The implications of sustaining colonized bodies are profound. When students learn to divide their identities, they may also begin to distrust their cultural knowledge, disengage from community, and feel pressure to become someone else in order to succeed. This fragmentation can lead to long-term consequences for mental health, sense of belonging, and political consciousness. This is how colonized bodies are sustained: not just through explicit erasure, but through slow, insidious disconnection from community, from culture, from self. The cost of academic success becomes the fragmentation of the learner. The cost of inclusion is erasure. Recognizing this is not merely an invitation for "culturally relevant pedagogy," but a call for decolonial reimagining. Science education must be more than inclusive, it must be transformative, capable of holding and valuing the complex, hybrid, and historicized identities of racialized youth. Otherwise, it remains a space that reproduces colonial logics under the banner of neutrality, objectivity, and excellence.

5.2 Reclaiming Identity through Decolonial Possibilities in Science Education

The fragmentation of our Tamil identity in the science classroom, as discussed earlier, is not inevitable. While current structures in science education often reinforce colonial hierarchies through credentialism and epistemic exclusion, there are also openings for students to reclaim their identities. This reclamation is not about altering who we are to fit within science, but about transforming how science itself is practiced, taught, and imagined. Such transformation begins with reorienting toward the processes of science, particularly inquiry and design, as culturally meaningful and identity sustaining practices. Mainstream responses to inequity in science education often focus on the addition of non-Western scientists or cultural examples into existing curricula. While this can be a useful starting point, it frequently remains superficial. These efforts can reassert science as a stable and objective canon to which marginalized voices are

merely appended. As Tuck and Yang (2012) remind us, such inclusionary gestures can function as settler moves to innocence, offering the appearance of diversity without challenging the underlying colonial logics that define what counts as legitimate science. Including Tamil herbal medicine or Indigenous ecological knowledge in a textbook does not automatically shift the terms of engagement, especially when these knowledges are framed as supplemental rather than foundational. Reclaiming identity within science education requires inviting students to engage as knowledge producers through meaningful inquiry and culturally responsive design. Science, at its core, is a way of knowing. It is a process of questioning, testing, interpreting, and creating. Yet in colonial education, these processes are often reduced to a checklist. The scientific method becomes procedural, and design is disconnected from lived experience. For students whose cultural traditions value relationality, spirituality, and collective knowledge, this narrow framework of scientific engagement can feel disconnected and even harmful.

Paris (2012) argues for a shift toward culturally sustaining pedagogy. This involves not just representing diverse students in the curriculum but sustaining and evolving their cultural practices within academic contexts. For us Tamil-Canadian students, whose identity work involves negotiating between family, community, and school, culturally sustaining approaches offer opportunities to engage science through our own cultural logics, metaphors, and histories, rather than being asked to suppress those parts of ourselves in the educational spaces. This perspective is supported by Smith et al. (2022), who offer examples of science curricula grounded in community-based inquiry and place-based problem solving. Their work highlights how students can frame scientific questions in relation to environmental justice issues in their neighbourhoods or draw on intergenerational knowledge systems. These models move beyond representational inclusion and toward a structural rethinking of science as a lived, relational

practice. Higgins (2014) furthers this approach through de/colonizing pedagogy that utilizes participatory videography. His work supports critical reflection on how science education interacts with students' identities and whose knowledge is valued. In this participatory model, students are co-constructors of knowledge. They reflect on their positionality and examine how their lived experiences intersect with scientific inquiry. This creates a radically different science classroom, one that is dialogical, reflexive, and inclusive of multiple ways of knowing.

From a decolonial perspective, these practices are not only pedagogical innovations. They are refusals to continue participating in colonial systems that define Western science as the only legitimate framework. These practices invite students to question the authority of scientific norms and to consider how their own cultural values, histories, and ways of knowing might shape new forms of inquiry. As Holland et al. (1998) suggest, this allows students to inhabit new figured words where science is not external to their identity but rather shaped by, and shaping, who they are. Reclaiming identity through science involves several interconnected shifts:

- Framing inquiry as a process rooted in curiosity about community, diasporic memory, or family experience, not just abstract problems.
- Approaching design as a relational and ethical practice that draws on cultural knowledge, not just technical skills, or innovation.
- Encouraging reflexivity so that students consider how their identities and experiences influence what they ask, how they observe, and how they make sense of the world.
- Validating alternative epistemic tools such as storytelling, metaphor, and embodied knowledge alongside the Nature of Science

These shifts do not resolve the broader structural inequities embedded in science education. However, they open important pathways for students, especially those from diasporic and racialized communities, to experience science as a space of belonging, agency, and possibility. They enable the integration of identity and inquiry, challenging the longstanding division between the personal and the scientific. This is not a rejection of science but a reclaiming of it. It is a call for a science that is flexible, plural, and rooted in justice. A science that welcomes the complete identities of its learners. A science that does not require us to fragment themselves, but instead encourages us to create, question, and contribute from where we stand.

5.3 Conclusion: New Figured Worlds

This study began as a narrative inquiry into the lived experienced of navigating science education as a Tamil-Canadian student in Ontario. What emerged was not merely a critique of curriculum content or academic performance, but a deeper engagement with the sociocultural and structural forces that shape how we Tamil-Canadian students engage with science, and how we are positioned within it. Framed through the theoretical lenses of figured worlds (Holland et al., 1998), Critical Race Theory (Ladson-Billings, 1998), and decolonial thought (Tuck & Yang, 2012), this research sought to illuminate the ways in which science education simultaneously promises mobility and enacts exclusion.

The first major finding revealed that science is often framed by us not as domains of inquiry or creativity, but as strategic credential, a necessary step toward economic security and social legitimacy. This motivation is shaped by family expectations and histories of migration, but also embedded in broader structural norms within the Canadian schooling system that equate success with the accumulation of qualifications (Collins, 2019; Laberee, 1997; Van der Meer,

2011). Within this context, science becomes a terrain of survival rather than exploration, and we often adopt instrumentalist approaches to learning that prioritize performance over understanding. Yet the cost of this survival is steep. The second major finding points to a fragmentation of identity that occurs when we must separate our cultural selves from our scientific selves. In schools where science is presented as neutral, secular, and culturally detached, we often suppress the relational, spiritual, and intergenerational dimensions of our Tamil identity in order to succeed. This form of compartmentalization, while often understood as a personal coping strategy, is in fact a structural outcome of colonial education that privilege Eurocentric epistemologies while devaluing other ways of knowing (Battiste, 2013; Dei at al., 2022). The science classroom thus becomes a space of disconnection rather than belonging, performance rather than presence.

However, we also offered moments of resistance, reflections, and reimagining. Through storytelling and dialogic engagement with each other, we began to question the long-held assumption that our cultural selves must remain separate from our scientific identities. Some expressed a growing curiosity about Tamil scientists, while others reconsidered ancestral wisdom that had previously been dismissed as unscientific. These reflections signal the beginning of a shift from science as a mere credential to science as a space of curiosity, connection, and cultural reclamation. Rather than reject scientific practice, we began to envision new ways of engaging with it, informed by ethical, relational, and culturally grounded perspectives. For instance, Keeran expressed an interest in learning from Indigenous communities in Canada to rethink how ethics are taught and practised in healthcare. Nila, working in the pharmaceutical sector, described a new openness to holistic approaches to healing, approaches once viewed as incompatible with Western paradigms, but now seen as offering valuable insights into culturally

responsive care. These reflections suggest that possibility of constructing new figured worlds, where the boundaries between science and culture are not rigid but relational, and where multiple epistemologies can coexist.

The pedagogical implications of these findings are significant. Tuck and Yang (2012) warn of superficial efforts to "include" cultural content into curricula that often function as settler moves to innocence, doing little to disrupt the underlying colonial logics of schooling. Rather than focus solely on content inclusion, this study affirms the importance of reimagining the processes of science, particularly inquiry, design, and experimentation, as sites of cultural relevance and identity negotiation. Drawing from culturally sustaining pedagogy (Paris, 2012) and recent work in science education (Smith et al., 2022; Higgins, 2014), this study argues for pedagogical approached that honour students' lived experiences, support reflexivity, and encourage collaborative, community-grounded knowledge production. To move toward truly inclusive and just science education, we must shift the focus from merely adding diverse figures to textbooks toward a fundamental transformation of epistemological and pedagogical structures. This includes creating space for students to draw on intergenerational knowledge, reflect on their positionality, and ask questions that emerge from their own communities. It also requires science educators to critically examine how norms around objectivity, rationality, and neutrality may reproduce colonial hierarchies, and to embrace more relational, ethical, and pluralistic approaches to teaching and learning science.

As this study has shown for us Tamil-Canadian students, the stakes of science education are not merely academic, they are deeply existential. Our future, families, and sense of self are shaped within the walls of the science classroom. When that classroom affirms only one way of knowing, one way of being, it fails not only us, but everyone. To create science education that

truly serves all students, we must move beyond inclusion toward transformation of curricula, pedagogies, institutions, and the very assumptions that underlie our educational systems. This is not only the challenge before us, but the responsibility we carry as educators, researchers, and community members committed to justice.

5.4 Limitations

One limitation of this study is the relatively small sample size. Although the initial goal was to recruit six to eight participants, the timing of recruitment (scheduled during the final examination period for undergraduate students) resulted in lower participation. This highlights the importance of planning recruitment efforts during periods when students are less burdened, such as at the beginning of a term or during summer break. Nevertheless, the use of narrative inquiry as the guiding methodology prioritizes the quality and depth of individual stories over the quantity of participants. The aim was not statistical generalizability, but rather an in-depth exploration of the complex, often contradictory, experiences of Tamil-Canadian students navigating science education (Connelly & Clandinin, 1990). To that end, considerable effort was made to include participants with diverse backgrounds and trajectories. The group includes eldest daughters, middle sons, and only children, reflecting varied family dynamics and roles. Our science pathways also span a broad spectrum: one participant is focused on medicine within the healthcare field; another studies psychology, engaging with behavioural and sociological dimensions of science; a third is in computer science, exploring the intersections of technology and scientific inquiry; and the fourth (as well as myself) were in biochemistry, rooted in laboratory-based research. Moreover, our social and geographical contexts differ significantly. We came from Tamil-majority neighbourhoods, more ethnically diverse areas with limited Tamil community presence, and predominantly white communities. This variety has allowed for a more

nuanced picture of how Tamil-Canadian identity is negotiated across different sociocultural environments. Thus, while the number of participants is limited, the richness and diversity of our experiences enhance the trustworthiness of the findings. Our stories provide a valuable window into how credentialism and identity fragmentation are felt, resisted, and sometimes reproduced by Tamil-Canadian students within the broader structures of Ontario's science education.

Another limitation of this study lies in my positionality as a Tamil-Canadian researcher. My shared cultural background with participants, while a source of deep insight and relational trust, also introduces the risk of interpretive bias. My own experiences navigating science education may have shaped the kinds of questions I asked, the way I interpreted participant narratives, and the themes I emphasized during analysis. There is always the possibility that, in seeking resonance, I may have overlooked dissonant perspectives or projected my own meaning onto participants' stories. However, this possibility is also a strength. As scholars of narrative and qualitative inquiry have long argued, particularly within critical and decolonial paradigms, research is never neutral. My insider status allowed for a level of cultural fluency, mutual understanding, and relational depth that may not have been possible otherwise. Participants often shared stories with cultural nuance or emotional complexity that required contextual knowledge to fully grasp. My lived experience enabled me to notice patterns that may not be visible to outsiders. I approached this dual role with ongoing self-awareness, engaging in critical dialogue with myself throughout the process. Rather than viewing my positionality as a flaw to be corrected, I acknowledge it as a lens that both illuminates and filters, and thus must be continuously interrogated to uphold the integrity and depth of the study.

5.5 Contributions

The collective narrative that came from this research serve to contribute in many areas including classroom practices, government policy and initiatives, and decision-making within the Tamil community. To begin with, the findings within the narratives expose educators to the experiences that Tamil-Canadian students may have in the classroom which not only encourage them to understand curriculum as a living and adaptable document, but also inform their pedagogical practice and assessment choices that favour opportunities for healthy identity negotiation within students. In addition, the study encourages support staff such as guidance counsellors to examine their own bias and assumptions as well as consider both Tamil-Canadians home and school life when advising on streaming options for the student's education. Beyond the school, the findings also inform policymakers, from school boards to the Ministry of Education, of the nuanced experiences of the underrepresented Tamil-Canadian group in areas of equity, diversity, and inclusion that fills the gaps that generalized assumption of minority groups brings forth. In doing so, policies translate into practices that become more constructively targeted rather than performativity addressed in a "one-size-fits-all" initiative. Finally, the collective narrative is a reflexive opportunity for the Tamil community in Canada, one in which Tamil parents can critically consider their role in the formation of their children's hyphenated identity, as well as the powers structures that creep within the social institutions their children inhabit. Most importantly, this research offers Tamil-Canadians a look into the agency employed by members of their community when negotiating between their Tamil and Canadian identities during K-12 schooling, both validating their experiences and establishing a sense of belonging.

5.6 Future Direction for Study

While this study has offered a deep and localized understanding of our Tamil-Canadian student experiences within Ontario's K-12 science education system, future research could

expand both geographically and demographically. A cross-provincial study, including Tamil students in provinces such as British Columbia, Alberta, Manitoba, and Quebec, would illuminate how regional differences in education policy, curriculum, and community demographics shape students' motivations and identity negotiation in science. Though education is provincially governed in Canada (Young et al., 2008), the Pan-Canadian Science Framework provides a shared vision that outlines common goals for science learning. This shared framework offers a valuable point of comparison, allowing researchers to examine how national objectives are interpreted and implemented different across provinces, and how those interpretations impact racialized learners like Tamil-Canadian students. Exploring this could help identify both consistent challenges and context-specific opportunities for culturally sustaining science education.

Another important direction for future study involves focusing specifically on the gendered experiences of Tamil-Canadian girls and women in science education. While this study included a range of voices, it did not explicitly foreground how intersecting dynamics of gender, race, and cultural expectation shape participation in STEM. Tamil-Canadian women often navigate the dual pressures of being underrepresented in scientific fields and managing gender norms within their own communities. Examining their stories more closely could reveal distinct barriers and strategies of resistance, offering insights into how educational systems might better support and empower young Tamil women to thrive academically, professionally, and culturally within science.

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Appendix A: REB Approval

University of Manitoba | Research Ethics and Compliance

Human Research Ethics - Fort Garry
66 Chancellors Circle
Winnipeg, MB R3T 2N2
humanethics@umanitoba.ca

PROTOCOL APPROVAL

Effective: March 17, 2025 Expiry: March 16, 2026

Principal Investigator:	Puvithira Balasubramaniam
Advisor(s):	Lucy Delgado
Protocol Number:	HE2025-0031
Protocol Title:	*Negotiations of the Tamil-Canadian Identity in Ontario's K-12 Science Education*

Martha Koch, Acting Chair, REB2

Research Ethics Board 2 has reviewed and approved the above research. The Office of Human Research Ethics (OHRE) is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans- TCPS 2 (2022).*

Please note the following important information about your protocol approval:

i. Approval is granted for the research and purposes described in the protocol only.

ii. Any changes to the protocol or research materials must be approved by the OHRE **before implementation**.

iii. Any **deviations** to the research or **adverse events** must be reported to the OHRE immediately through an **REB Event**.

iv. This approval is valid **for one year only.** A Renewal Request must be submitted and approved prior to the above expiry date.

v. A **Protocol Closure** must be submitted to the OHRE when the research is complete or if the research is terminated.

vi. The University of Manitoba may request to audit your research documentation to confirm compliance with this approved protocol, and with the UM *Ethics of Research Involving Humans* policies and procedures.

Appendix B: Consent Form

University of Manitoba
Faculty of Education
Department of Educational Administration, Foundations, and Psychology

Faculty of Education
Education Building
Winnipeg, Manitoba
Canada R3T 2N2

Participant Informed Consent Form

Study Title:	Negotiations of the Tamil-Canadian Identity in Ontario's K-12 Science Education
Student Principal Investigator:	Puvithira Balasubramaniam, Master's Student Department of Educational Administration, Foundations, and Psychology Faculty of Education email: balasub1@myumanitoba.ca
Student Advisor:	Dr. Lucy Delgado, Assistant Professor Department of Educational Administration, Foundations, and Psychology Faculty of Education email: lucy.delgado@umanitoba.ca

Conflict of Interest and Undue Influence: Puvithira Balasubramaniam does not have any conflicts of interest in this research.

You are being invited to participate in an interview as part of a research study. This consent form, a copy of which you can download or print, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, feel free to ask me. Please take the time to read this document and any accompanying information carefully. It is very important that you understand:

- what is being asked of you;
- what the risks and benefits of participation are; and
- how the information you provide will be used and stored.

Description & Purpose of the Study: I am doing this research for my Master's thesis under the supervision of Dr. Lucy Delgado. This research study seeks to understand the collective experiences of Tamil-Canadians within Ontario's K-12 science classrooms. Despite Ontario being host to the largest Tamil diaspora population outside of South Asia, there is currently limited academic literature to draw from to understand the experiences of Tamil-Canadian students within Ontario's education system and its impact on their cultural identity, let alone in the context of science education. Through my own Tamil-Canadian lived experiences and interviews with Tamil-Canadian participants, my research aims to provide insight into what motivates Tamil-Canadians to pursue science education and, in turn, science education's impact towards (re)shaping our Tamil identity. In doing so, educators will better understand how to sustain multicultural identities, such as Tamil-Canadians, within their science classrooms.

Study Procedures: As a Tamil-Canadian who has taken part in Ontario's K-12 science education, you are being invited to participate in a short demographic questionnaire, with the possibility of a follow-up one-on-one interview where you would share your experiences in schooling and science, in relation to your Tamil identity. If you decide to take part in the study, you will first be asked to complete an online demographic questionnaire through the University of Manitoba (UM) licensed Microsoft Forms. The survey should take about 5-10 minutes to

complete. If selected to continue in the study, you will then be asked to participate in an interview which will take place online via University of Manitoba (UM) licensed Microsoft Teams and will last about 60-90 minutes in length. When you arrive for the interview, we will review and confirm your consent and be reminded that the interview will be recorded. Then the recorder within UM Microsoft Teams will be started, and the recorder will be stopped at the end of the interview. The recorded interview will be transcribed and once the interview is transcribed, you will be able to review the transcript and make changes to it to better reflect what you want me to know. I will email you a copy of the transcript and you will have 2 weeks to respond. If I don't hear from you after 2 weeks, I will assume that you are okay with the transcript as is.

Study Risks: The research involves minimal risks, meaning that the risks are no greater than what might be encountered in daily life.

Study Benefits: Participating in the study may provide validation to your Tamil-Canadian experiences. Ultimately, this research fills a gap in the literature and provides contemporary insights into Tamil-Canadian experiences in science classrooms and the Canadian education system more broadly.

Compensation: There is no compensation for this study.

Use and Storage of Information: All the information you provide as a participant in this study is confidential which means we (my advisor and I) must keep it safe. We will do our best, however, it is not possible to guarantee absolute confidentiality. We will only share your personal information if required through court order or law (e.g., suspected child or elder abuse).

Only my advisor and I will have access to your data. The short demographic questionnaire will be stored on the University of Manitoba supported OneDrive cloud storage, in a separate file from the interview collected data. The questionnaire data will be destroyed by December 2030. The audio recording from the interview will be transcribed and then the audio recording will be destroyed by December 2025, at the latest. I will code your transcript so that it contains no identifiable information. The audio recording and the transcript will be stored on the University of Manitoba supported OneDrive cloud storage. Handwritten notes during the interview will also be coded so that there is no identifiable information. The handwritten notes will be securely stored in a locked cabinet and destroyed by December 2030. I will have a file that links your name and contact information to your research information using a code. I will keep the file with your name, contact information, and code separate from the research information you share with me, destroying it by December 2030. When I share the results of this study, I will combine everybody's responses. I may use some of your information through quotes. The quotes will not include your name but use pseudonyms or labels such as, "one participant felt that, …". Your transcript will be destroyed by December 2030.

Your research information may be shared outside of the University of Manitoba with researchers, other organizations, and/or made publicly available. The information is being shared for further analysis or testing, as part of the research study, and/or because it is required by a funder or journal. It will not include your name or any information that could directly identify you.

Dissemination: The study results will be shared through 1) the publication of a master's thesis; 2) journal publications; and/or 3) academic conferences. I will also prepare a summarized report of the study results to be sent to interested participants by July 2025.

Withdrawing: Your participation in this research study is voluntary. You can choose to answer only the questions that you are comfortable with. You may withdraw from the study for any reason. You do not have to explain why. You will not be penalized in any way. Should you withdraw partway through the study, all of your information will be destroyed unless you have consented to allowing us to keep it. You may withdraw from the study until June 2025. After this date, I will start the analysis so it may not be possible to withdraw your information as it will not be linked to your name. To withdraw, please contact me, Puvithira Balasubramaniam, at the email above.

Questions or Concerns
Designated University of Manitoba personnel may check that this study is being done safely and properly. To do this, they may visit the study site or review the research records. I will tell you if someone outside the research team will be there while you are participating. If this makes you uncomfortable, you can tell me and I will ask the personnel to return at another time.

This study has been reviewed and approved by a Research Ethics Board at the University of Manitoba. However, this does not mean that participation is risk-free. If you have questions about your rights as a research participant, you may contact the Office of Human Research Ethics at humanethics@umanitoba.ca or (204) 474-7122.

If you have any questions, concerns, or complaints about this study, you may contact me or the Office of Human Research Ethics.

Consent
By signing this document, I agree that:

- I have read the above information or had it read to me;
- I have had the opportunity to ask and have answered all of my questions;
- I understand what is being asked of me;
- I will be taking part in a research study;
- I may freely stop or leave the research study activities at any time;
- My information may be shared outside the University of Manitoba;
- I do not waive my legal rights by participating in the study.

Notice Regarding Collection, Use, and Disclosure of Personal Information:
Your personal information is being collected under the authority of *The University of Manitoba Act*. The University of Manitoba is committed to preserving your right to privacy. The information you provide will be used by the University to support our research. Your personal information will not be used or disclosed for other purposes, unless permitted by *The Freedom of Information and Protection of Privacy Act* or *The Personal Health Information Act*. If you have any questions about the collection of personal information: Ph: 204-474-9462 or Email: fippa@umanitoba.ca

I agree to participate in this study.	___ YES	___ NO
I agree that my interview can be audio recorded.	___ YES	___ NO
I would like to receive a summary of the study results.	___ YES	___ NO

_____	_____	_____
Participant Name	Participant Signature	Date

Summary of Results
Please provide an email address below if you would like to be sent a summary of the study results and/or my individual results.

Email address: _____

Appendix C: Interview Protocol

University of Manitoba | Faculty of Education
Department of Educational Administration, Foundations, and Psychology

Faculty of Education
Education Building
Winnipeg, Manitoba
Canada R3T 2N2

Interview Protocol

Negotiations of the Tamil-Canadian Identity in Ontario's K-12 Science Education

The purpose of the interview is for me to unveil what the experiences of Tamil-Canadians are in Ontario's K-12 science classrooms as the current research literature has no information to draw from in this area. I am curious to know if and how you negotiated or navigated between your Tamil and Canadian identities when learning science to better understand how educators can improve their practices to sustain marginalized identities, such as Tamil-Canadians. As described in the letter of consent, I am providing you with the interview protocol prior to the interview so that you can have time to think about the questions that will be asked. Feel free to keep these pages, write on them, and bring notes to our meeting if you like.

When we do the interview, we will go through each main question and the corresponding prompts you wish to speak to. You do not need to respond to all of the prompts and we can skip any question or prompt, addressing as many or as few as you like.

Background: My research interests stem, in part from, my own life experiences. Born in Canada to Sri Lankan Tamil parents, I have always felt a sense of 'otherness' as I navigated between my Tamil and Canadian identities throughout different spaces like home and school. Having this dual consciousness from a young age made it confusing to understand how much 'Tamil' I could bring to school without further outcasting myself, and how much 'Canadian' I could bring home without slowly erasing my cultural identity. My concern is that trying to find the right balance is a lot to ask of children and often ends up having implications on how we develop our identity. In addition to this, I bring another research interest of mine, science education, into this study. I have vast experience with science education including:

- Taking part in science fairs during my Ontario elementary schooling;
- Completing Grade 9 and 10 sciences as well as Grade 11 and 12 Chemistry, Biology, and Physics courses during my Ontario secondary schooling;
- Obtaining a Bachelor of Science degree in Biochemistry;
- Obtaining Teacher Certification in Intermediate/Senior Chemistry and Biology;
- Working as a Summer STEM camp Instructor; and
- Currently researching science education curricula and pedagogy

My path to science was one that was very much influenced by dreams of pursuing medicine or engineering, a shared experience I have with many other Tamil peers I have met during my Canadian schooling. Science education is an interesting space to look at as it prioritizes 'singular truths' and requires following a rigorous scientific method to get to those truths, often invalidating any other way of knowing in the process. With many Tamil-Canadian's taking up science education at some point in their life, I wonder what implications these singular truths and prescribed methods have in our perception of who belongs in science and what counts as science.

For those reasons, my **research questions** are about what Tamil-Canadian students' motivations are for pursuing science during K-12 schooling and how the experiences within Ontario's K-12 science education (re)shape Tamil-Canadian students' identity.

Don't worry if these concepts feel more theoretical than practical. I have designed the questions to get at YOUR experiences as a Tamil-Canadian student—so feel free to share whatever you think makes sense. I will do the work of figuring out how to make sense of these experiences in the broader context.

~Interview Questions and Prompts~

When we begin the interview you will be reminded about your option to withdraw from the study at any time and that the interview will be recorded with your permission.

1. Can you tell me about your childhood and about growing up in a Tamil family?
   - What was the cultural demographic like in your city?
   - How did that impact you and your family (e.g. personal interests, cultural traditions, social circles, etc.)?
   - How would you describe your family dynamic (e.g. roles, expectations, relationships, etc.)?

2. Tell me about your memories of K-12 schooling. What was it like being a Tamil person in the Canadian school system?
   - How was your Tamil culture included into your daily schooling (in-class, recess-time, lunch breaks, extra-curricular activities, etc.)?
   - How did your peers/teachers/administrators/principal interact with you?
   - What was your parents' involvement in your schooling?

3. Tell me about your memories of science classes during K-12 schooling. For example, how would you describe your time learning science?

4. What was it like being a Tamil person in your science classes? Did you feel as though your Tamil identity was honoured or reflected in your K-12 science experience?
   - For instance, in textbooks or lessons?
   - In non-graded activities like class discussions, guest presenters, or field trips?
   - In graded activities like projects, labs, or tests?

5. What made you pursue your major in your current undergraduate studies?
   - How were you supported in your decision by your parents?
   - How were you supported in your decision by your teachers?
   - How were you supported in your decision by your peers/friends?

6. Based on those experiences, what did being Tamil-Canadian in science mean to you as a child vs. now?

Thank you for your time today.