

Contested Subjectivities: Loving, Hating, and Learning Mathematics

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Abstract

This dissertation is a *currere* study of how five students and their teacher understand their mathematical learning inside a Grade 10 classroom in Quebec. More closely, this research examines how recollections of past, present, and future mathematizing are tied to one's sense of identity. Through analysing the entries in a teacher journal and the autobiographical stories of former students, identifications with and against common tropes of what it means to be “good” at mathematics were examined. This dissertation thus asks, how do participants in mathematics teaching and learning read their experiences, and why does a study like this matter to the future of the subject or to education overall?

Using the autobiographical Curriculum Studies method of *currere*, a psychoanalytic stylistic analysis, and a cultural studies component whereby participants were encouraged to respond to the characters in the popular sitcom *The Big Bang Theory*, responses were gathered through individual interviews. Insights were derived from psychoanalytic readings of both transference and countertransference taking place in the learning space and beyond. The researcher's and participants' responses were understood through the ways in which the teacher's emotional world is transferred onto the act of teaching and how, reciprocally, the teacher is addressed through feelings, phantasies, defences, and anxieties. The former students were interviewed with the stages of *currere* in mind in order to elicit free associative responses that lent insight to the regressive, progressive, and analytic stages. The final, synthetic, stage of *currere*

took place to unpack my identificatory work as a researcher and teacher in the mathematics classroom.

The methodological considerations in this dissertation included outlining the significance of repetitions of language in interviewees' responses, both individually and collectively. Participants' responses began to indicate a complex emotional world whereby their categorization in a "lower" mathematics course in high school nevertheless did not trap their identities into common tropes of negativity, difficulty, and anxiety. Rather, the types of language and frequency of word use signal how the emotional landscape of students' mathematical lives is shaped by how students perceive teachers to see them as mathematical or not.

This research reveals how mathematics concepts, but more often, pedagogical dynamics, lead to complicated psychological terrain traversed by both teachers and students. I argue that using *carrere* as a methodology readily employable with high school students helps to uncover the complex worlds of mathematical identity formation including the role of societal stereotypes. Furthermore, if educators understand their own dynamics of love and hate in relation to mathematical competence, performance, and pedagogy, they might better foster mutuality between students and teachers overall.

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Prologue: A sad inspiration

We shall count as real what we can use to intervene in the world to affect something else, or what the world can use to affect us.

(Hacking, 1983, p. 146)

Journal Entry

August 16, 2014: *I've been thinking a lot about my teaching over the past seven years. My motto has always been to think about the students who are "least like me." Not urban, not Indian, not good at maths. As the new school year approaches, I wonder what that means, what to do differently. I lay around a lot on the couch thinking. I've always "gotten" mathematics; it comes easily and I can see and feel the answers coming as the steps unfold. They feel satisfying. But I always return to this one kid, Courtney...my exact opposite. I remember when I asked her in front of everyone to provide the simple last step to an algebra equation, "...and when you divide three out of eighteen, you get?" Tears. I remember my own horror. Courtney can't even divide! ... Rise over run takes over my life for two months in the fall of every year. Why is it so hard? I even have a fun project where we "bungee jump" Barbie Dolls using elastics and plot the points which turn out very linear. Still, every May before the Ministry Leaving Exams in June, the students look at me with terror and apathy when I go back to review that terrible concept. They rehearse what I have taught them. I hate slope. I hate it for the kids. They want to please me and please the government exam. I know I use their emotional attachments to me. They want me to be proud of them by doing a good job. I give them help sessions and model cheat sheets to get them through. And they come back to me joyful, exclaiming "look, Miss!" ... passing grades in June after all the struggle and heartache – I really am proud of them because they thought they*

couldn't do it. Still, I am not sure they really ever get the concept of rise over run deep down. Maybe it doesn't really matter but it still bothers me.

This story from my teaching journal is a sad one. And even though the entry is from a few years ago, the sadness stays with me as I enter my classroom each autumn to teach new students mathematics. How can any student be so frightened of numbers? And why am I deeply bothered by the concepts I need to teach? The quotation at the beginning of this prologue, from Ian Hacking's (1983) *Representing and intervening: Introductory topics in the philosophy of natural science*, reminds me that teaching has been for me about the moments that "intervene" – those which crack open the ways the "world can...affect us." Just as simple calculations apparently intervene in Courtney's life – turning it upside down, reducing her to tears – her experience has been a constant intervention in my teaching life, a splinter in my mind and heart that remains painful even as the years go by. And it is one I cannot seem to remove.

I undertook the task of self-reflexively analysing this old journal entry to understand why it has held so much power over me as a teacher, and I will return to the analysis further along in this dissertation. However, what remains powerful for me is the remembrance of that day. The splinter has persisted in its pain over the years, and drives me to search for ways to understand the different complex emotions in the story – frustrations, elations, and even hatred. And thus the story of Courtney became the impetus for this study, the reason to seek out various bodies of research. Through early readings, I learned about a field that employed psychoanalytic concepts to understand student and teachers' mathematical subjectivities (Bibby, 2011; Black, Mendick, & Solomon, 2009; Britzman, 1998), and this work began to open my eyes to the ways

psychoanalysis is a window into the struggles of the unconscious and how conflicts might emerge in teaching and learning. As Bibby (2010) explains,

Psychoanalysis suggests that we are all defended subjects, that we unconsciously protect ourselves from ideas and feelings we cannot bear... [through] a series of unconscious processes that we use to defend ourselves against ideas and emotions that we find psychically painful, difficult, or otherwise unacceptable. ...[T]hey are descriptions of ways of being, adopted and developed unconsciously. (p. 23)

This was a revelation. What are these feelings and ideas I cannot bear about Courtney and students like her? What defences were at play when she broke down after being asked to perform simple arithmetic? There must be feelings within education's spaces that amount to things we "cannot bear" for teachers and students alike. As such, this study is my entry into the emotional world of teaching and learning mathematics.

Beginning with going back to the works of the historical psychoanalysts – Freud, Lacan, and Klein, among others – I began a journey into understanding the role of desire, loss, love, hatred, and fear in my classroom, beginning with me.

Chapter 1: Introduction

Context and Statement of the Problem

This dissertation traces the psychic life and social conditions of learning and teaching mathematics in a rural Anglophone school in Quebec. In the province of Quebec, there are eleven grades not twelve, and three Grade 10 courses are mandatory for graduation: Science, Mathematics, and History. In Grade 11, students must pass French and English. All of these courses have government exams. Since the majority of schools are not semestered in the province, the stakes are particularly high for students who fail because they have to repeat an entire year. For Quebec teenagers, this means completing the June Ministry Exam in either advanced (“Science Option”) or regular (“Cultural, Social, Technical Option”) Grade 10 mathematics. Passing one course or the other is mandatory by the Ministère de l'Éducation, de l'Enseignement supérieur et de la Recherche (MEESR).

As a classroom teacher, I find the names of these courses deceptive. The “applied” or “lower” course, Cultural, Social, and Technical (CST) mathematics has been the bread and butter of my job. However, I feel there is nothing cultural about it. Instead, the course is comprised of a traditional curriculum of functions, trigonometry, and statistics¹. Over the course of five years from 2010 to 2015, I taught several hundred students CST mathematics in a rural school in West Quebec. I now teach at an urban school within the same Board. During this time, I have documented my teaching life in a journal, entering observations about students, lessons, moments that strike me, or questions I have. The

¹ The students in this research also studied probability (mathematical expectation) in CST mathematics, but it was removed from the curriculum to improve pass rates in the province of Quebec beginning in September 2016.

two questions which have quietly loomed in the background of such ongoing journal entries are: 1) How do the students seem to feel about their CST mathematics experience? 2) How do *I* feel about teaching this course? Some hints emerged in the everyday language of the students at the school who called the course “low math,” an obvious pairing to the sister course “high math” (the Science Option). This common “coding” of the course felt like an identity statement: students in CST appeared on the surface, at least, to write their mathematical lives from below, looking up at those high up in the advanced course.

Appelbaum (2008b) describes the teaching of mathematics as an act of ongoing learning. I contend that this research is an extension of his pedagogical view. It is also the reason for an obvious omission in the subtitle of my dissertation: *Loving, Hating, and Learning Mathematics*. Why is the word “teaching” absent? Appelbaum’s words in the Prologue to his book, *Embracing Mathematics: On becoming a teacher and changing with mathematics*, helps to answer this question. He asserts: “As a teacher, the meaning of my profession is determined in the ways that I ‘teach.’ ...I choose to find no sense in teaching distinct from student-ing: teaching is learning, and learning is teaching” (2008, p. 1). By learning with and through my teaching and journal entries, I further search for ways to do what Appelbaum calls *mathematizing*: “to seize opportunities for interpreting experience, listening to others, articulating and representing for others, in mathematical ways...” (p. 1). Perhaps, then, I document my ongoing *becoming* as a mathematics teacher, one who continues to learn about, and alongside, her students.

The feelings of loss and desire, hatred and adoration expressed in my vignette remind me that educational spaces are fluid, affective spaces almost all of the time. The

emotional terrain of teaching and learning mathematics has been recognized in educational research in mathematics and there has been substantial work in North American and European (specifically British) contexts identifying a pervasive problem of students disliking or fearing mathematics. The conversation about students' performance and relationship with the mathematics curriculum in various provinces in Canada has taken on a public dimension through mainstream and social media discussions. As recently as April 2016, the Canadian Broadcasting Corporation (CBC) published an online article reiterating what has long been a popular debate amongst critics: "teaching methods that deemphasize learning the basic skills" (n.p.). With policymakers and educators on both sides of the coin regarding whether learning basics is a "dead issue," it is clear that fear about poor mathematics performance on provincial and international tests still takes centre stage as a matter of public concern.

Cited in the CBC article, Marian Small, founder of the University of New Brunswick's Mathematics Education Centre and an advocate of discovery based mathematics learning, argues that children are to blame. She states that moving away from so-called fundamentals of memorizing multiplication tables, long division and so on, reflects the "I don't have time for anything, I don't want to be bored" culture and that "[k]ids are less patient to do things that they used to do and that has nothing to do with curriculum" (n.p.). University of Manitoba mathematics professor Robert Craigen argues the opposite: "It's long been settled that the establishment of basic facts, in memory, and the development of automatic skills for the most basic tasks is really of fundamental importance in developing long term skills" (n.p.). As the debate rages on, it is clear that there are problems with the perception and performance of students in mathematics across Canada. While literacy scores improved across Canada between

2009 and 2015, mathematics scores continued to decline, “suggesting that policies specific to mathematics contributed to the declines” (Stokke, 2015, p. 3). There are also indicators that there are cultural factors at play that contribute to low math performance and increased public and private anxiety surrounding this fact. Ian VanderBurgh, Director for the Centre for Mathematics and Computing at University of Waterloo asks in a 2016 interview with the *National Post*,

We have a very good tradition in North America of reading to our kids at home, but how many of us do math with our kids at home?... There’s lots of math phobia out there and it’s very easy to pass it along to our kids. (n.p.)

But what constitutes mathematics phobia, or mathematics anxiety, and how it has been addressed in educational research?

This field, known as Mathematics Anxiety Research² is dedicated to specific topics such as the fear of failing, depressive emotions, and mathematics avoidance (Bekdemir, 2010; Zan, Brown, Evans & Hannula, 2006). Studies have revealed the neurological consequences of anxiety whereby working memory cannot be used for mathematics when the mind is overcome by anxious thoughts (Ashcraft & Krause, 2007), and that mathematics anxiety lowers performance because people with anxiety avoid mathematics tasks altogether (Chinn, 2009). The effect is often cyclical. Low mathematics performance, as Hembree (1990) suggests, causes subsequent mathematics anxiety. Moreover it influences one’s perceived competence on tests (Bandalos, Yates & Thorndike-Christ, 1995; Marsh & Martin, 2011). Mathematics Anxiety Research often uses quantitative metrics to understand students’ performance by having students answer

² I have capitalized these three words to indicate the field of Mathematics Anxiety Research as a cohesive body of research with a particular interest in studying low self-efficacy in mathematics.

scaled questions to hypothetical scenarios on tests such as the Math Anxiety Scale for Children (MASC) or the many versions of the Mathematics Anxiety Rating Scale (MARS). The “MARS is a 98 item, 5 point Likert type instrument that assesses the levels of anxiety in situations involving numbers” (Arslan, Deringol-Karatas, Yavuz, Erbay, 2015). However, it does not account for the reasons for why students have mathematics anxiety, instead focusing on the levels of anxiety in various questions. This field of study, like the measurements of Canadian students’ scores on international tests like PISA, are data-driven. They measure anxiety through surveys but do not attend to the nuances within the individual lives of the participants – their stories, histories, and future aspirations.

Educational researchers who use qualitative methodologies have sought to understand student beliefs that lead to mathematics anxiety. Many students feel that mathematics is a mere accruing of facts and equations that should be memorized (Crawford, et al, 1994; Mtetwa & Garofalo, 1989) and mathematics problems are to be solved correctly and quickly (Anku, 1996; Frank, 1990). Others believe that only “math people” who are naturally talented are truly capable (Lim, 1999). Overall, it seems as though negative mathematical experiences are common amongst at least a subset of the school-aged population. Less well investigated is whether students have positive experiences with mathematics.

Given the highly affective space of learning and teaching, it seems urgent to me to understand my own self-identification as a mathematics educator alongside students’ responses to my teaching of the subject. Their emotions are shaped by their perceptions of mathematics prior to being in my course, and then on account of my pedagogy, subsequently leading to ways they represent themselves as learners. Britzman (1998)

reminds us that because our experiences are emotional, education is thus also emotional. The work of education itself is fraught by uncertainty because it draws upon our beginnings in the Freudian sense where our primal encounters with hate, love, and the anxiety of its loss as infants become the template for our future learning. Britzman (2013) calls this condition a “crisis of dependency” (p. 114). Education is where we often see the return of repeated conflicts in the psyche, combined with historical and cultural forces.

Britzman (2003) asserts that we might further investigate the ways learning and teaching are influenced by our childhood experiences of schooling. Here she reminds us, “after all, schooling is so familiar, teachers were once students and of course they were once children. Their history of learning can be unconsciously repeated, now transferred onto the position of teacher” (p. 15). In her more recent work, *The very thought of education: Psychoanalysis and the impossible professions*, Britzman (2009) reactivates the concern that teachers who are undoubtedly devoted to conveying knowledge to students do not cultivate a place for reflection about their educational histories or transferences into teaching. She explains that the “teacher’s psychical conflicts – affects conveyed through phantasy, anxieties, and defences against them – provided they can be symbolized, are an enigmatic resource for insight into the nature of teaching and learning...” (p. 86). In this study, I seek to unpack the psychoanalytic theatre, an unconscious history, brought to the scene of teaching. By paying conscious attention to the workings of the unconscious, I wish to better understand the dynamic between teacher and student(s) in the mathematics classroom.

If emotional forces shape the way teachers and students interact, then it is important to understand what these forces might be. There is an emerging field of research about mathematical identities in education which indicates that students and teachers alike are influenced by societal perceptions of what it means to be a “good” mathematics student (see Black, Mendick, & Solomon, 2009). Central to this research are teachers’ and students’ descriptions of their emotional relationships with mathematics – either good or bad. With the desire to add Canadian voices to this research, this dissertation is grounded in the existing literature describing discourses about mathematics in society, and specifically in popular culture (Greenwald & Thomley, 2007; Polster & Ross, 2012; Sklar & Sklar, 2012). I identify how students feel about their learning alongside how their mathematical identities might be shaped by societal messages. Popular culture television shows with clichéd representations of mathematics such as *The Big Bang Theory*, and cheap garments available in big-box retailers emblazoned with “math is hard so I let my brother do it,” remind us that there are numerous messages reaching my students and me about mathematics outside the classroom. Determining what it means to “be mathematical” is one of the goals of this work. For example, what does it mean to be a “high” or “low” mathematics student? Are students’ experiences always negative? While it is evident that there is trauma amongst some mathematical learners in particular North American contexts, in the hopes of shedding light on the larger phenomena, this work seeks to unpack the psychic dynamics of love and hate that play out in my vignettes and as I read my students’ stories alongside my own about living inside the world of the CST mathematics course specifically.

Overview of the Study and Research Questions

This study is a journey into the cultural, social and psychic spaces of what it means to be a mathematics teacher by understanding the identity performances taking place inside and outside of the classroom. The purpose of this study is thus to read the self alongside reading the stories that former students share about learning mathematics in order to get underneath the provocations that reside in mathematics as a “difficult” subject. To that end, I seek to “entertain the question” Britzman (2009) asks, “of what it can mean to think the thought of education as experience, as pedagogy, as affect, as uneven development, as intersubjectivity, and as the basis of the transference and countertransference” (p. 3). The transference includes the teacher’s emotional world transferred onto the act of teaching, and the countertransference is what teachers “feel back” from teaching: “how they are (unconsciously) addressed... feelings, phantasies, anxieties, defenses, and wishes made from what teaching feels like” (p. 82). To learn more about my self-identification as a mathematics teacher and researcher, I analyze students’ readings of a popular culture representation of mathematics – the dinner-hour sitcom entitled *The Big Bang Theory*. By listening to the stories told by former students about being in CST mathematics in Quebec as they read themselves alongside the characters and scenes in the television show, I inquire how teacher-researchers like myself might work with such stories as a starting place to discuss the implications for both teachers and students of streaming desire in mathematics into “high” and “low” courses. To this pedagogical end, how might we reread the scene of learning “low”

mathematics as a teacher? And, why might such pedagogical questions even matter for mathematics education here in Canada, and/or elsewhere?

Stories are a large part of the research that informs the existing mathematics identities literature (Boylan & Povey, 2009; Mendick & Moreau, 2014). Locating my work in the emerging field of mathematics identities that relies on psychoanalytic perspectives of subjectivity, I will outline the psychic and affective impacts of mathematics on the unconscious. One way to think about this is through the language those of us inhabiting the “scene” of mathematics use to describe learning (Lewkowich, 2015). The kind of language we use, as teachers and students alike, might be a way of inquiring into “what [we] considered – on a conscious level in which the unconscious nonetheless interferes – the possible meanings” of ... experiences (p. 224). This includes interpreting perspectives of our mathematical experiences alongside our personal readings of the popular show *The Big Bang Theory*.

My interest in using television as a way to provoke conversation about mathematics comes from my classroom pedagogy. My students and I look at how mathematics is represented in the news; I also use memes, popular culture references and even clichés to start conversations, lighten the mood, or simply to get students centred on one topic of conversation at the beginning of class. I’ve enjoyed doing this over the years because it is a “way in” to beginning the more difficult work of learning new concepts and applying them in various mathematical situations. The students like it too, bringing in their choices of artifacts, and giving their opinions and questioning mathematical “things” inside and outside the classroom. One of our primary objects of analysis, the show *The Big Bang Theory*, is described on the unofficial fan page as follows:

The Big Bang Theory is centered on physicists Sheldon Cooper and Leonard Hofstadter, whose geeky and introverted lives are changed when Penny, an attractive waitress and aspiring actress, moves into the apartment across from theirs. Penny quickly becomes a part of Sheldon and Leonard's social group, which includes the equally geeky engineer Howard Wolowitz and astrophysicist Raj Koothrappali, with Penny's common sense and social skills and the guys' geeky interests expanding each other's worlds. The newest additions to the group are Howard's wife Bernadette Rostenkowski-Wolowitz and Sheldon's girlfriend Amy Farrah Fowler. (About the Big Bang Theory, 2016)

In our CST class we talk about the characters and their exploits, alongside some of their funny trials and tribulations as part of the daily life of our classroom. The plots lived by these cliché “geeky” physicists who “breathe” formulas, science, and numbers, lets us open the book on our own trials in mathematics learning. Our collective classroom musings have been part of my journal entries as a teacher – vignettes about the show and my teaching life that guide this dissertation as I work through what it means to be a teacher of learners of mathematics.

In beginning this research, I was interested foremost in how we might understand the classroom space, where love, hate, and learning combine. How might we unpack what is going on in a space that is charged with emotion, resistances, desires, and denials? What role might *The Big Bang Theory* have in provoking a discussion about our mathematical lives? Looking at the possibilities inherent in rhetorical analysis of my journal responses using the language of psychoanalysis, I felt that an autobiographical/biographical inquiry method from curriculum studies would enable me

to further understand my journey as a teacher, and to better understand students' movements backward and forward through their past, present, and perhaps even future lives as mathematics students. In undertaking this research, I am able to establish a curricular framework for the entire dissertation – or what we might call *currere* as pedagogy – that becomes the structure to read myself alongside my former students' readings of their own learning.

Curriculum Studies as a field, through the use of *currere*, affords scholars opportunities to curriculum theorize about how individual stories lead to a reconceptualization of curriculum beyond describing student learning and behaviour against pre-determined curriculum objectives. Schubert (2010) explains that the field of Curriculum Studies attends to three things through a variety of sources:

(a) *perspective* on questions about what curriculum is or ought to be, (b) alternative or complementary *paradigms* of inquiry that enable explorations of such questions, and (c) diverse *possibilities* for proposing and enacting responses to the questions in educational theory and settings of educational practice. (p. 229, original emphasis)

There are several paradigms including empirical-analytic, hermeneutic-practical, critical praxis, and postmodern antiparadigms. Amongst these, within the hermeneutic-practical, “curriculum becomes a quest for understanding where we come from, who we are, who we hope to become, and how we hope to live in and contribute to the world. William Pinar and Madeleine Grumet and others have called this *currere*” (p. 234; emphasis added). This view of curriculum, which I will explore further in the literature

review, encourages methodologies that unpack students' and teachers' perceptions, feelings, and inner worlds – their lived curricula (Pinar, 1975a). In “Currere: A case study,” Pinar (1978) explains that *currere* is a:

method through which the interested student (be he professor, elementary-school teacher, high-school student, curriculum specialist) may examine his experience of schools and of particular aspects of schools (a particular teacher, a certain book, a melange of feelings regarding a particular year). The emphasis is on experience. The aspiration is to cut through the layers of superimposed thought to preconceptual experience, which is the ontological ground of all thought” (pp. 322-323, *sic* throughout).

This method is not a quick fix, but rather offers a way to understand the process of self-formation with and against our education. By framing this dissertation as through a *currere* methodology, I hope to inform the ethics of what underpins how individuals are committed to one another intersubjectively. *Currere* takes place in four stages as in Figure 1 below:

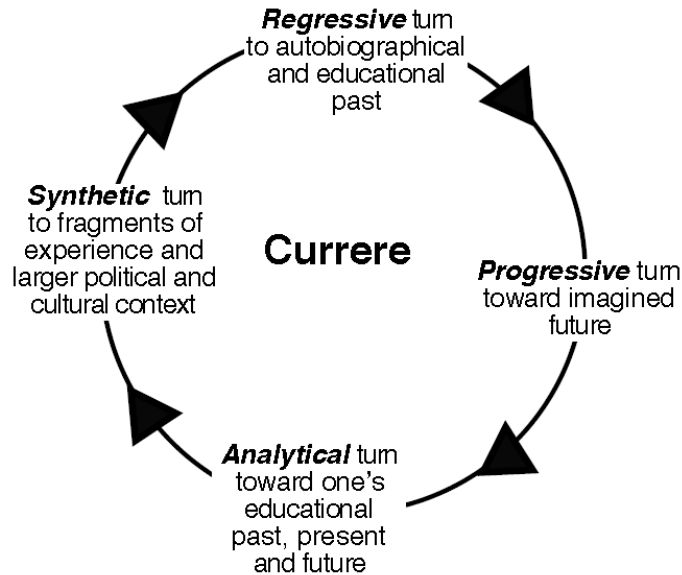


Figure 1. The method of *currere* as adapted by Petrina (2014) from Pinar (1975a).

In using methodologies like *currere*, the international field of Curriculum Studies offers different ontologies and epistemologies for revising the notion that the narrative “I” must represent a life “objectively” and “truthfully” and, similarly, for challenging representations of “self” and “other” (Clifford & Marcus, 1986; Kadar, Warley, Perrault, & Egan, 2005). The use of autobiography – in my journal entries and in the words of my former students during their interviews – affords opportunities for individuals to reclaim and articulate forgotten or hidden aspects of past histories which are otherwise “prevented from germinating owing to the constraints imposed by timetables and other institutional practices that mitigate against [their] use” (Graham, 1991, p. 13). The entire process exemplifies an intimate subjective engagement with the world. Subjectivity is given form, content, and singular experience through self-reflexive storytelling and reading the self (Robertson & Radford, 2009). As such, by conducting a

rhetorical analysis of former students' stories alongside my own, I hope to uncover, through moments that arise, some answers to the following research questions:

- 1) By reading former students' defences in the stories they tell about teaching and learning mathematics in the Grade 10 classroom in Quebec, what psychic conflicts are revealed?
- 2) Through *currere*, what do we learn about how mathematics shapes individual subjectivities beyond the classroom?
- 3) How can a *currere* pedagogy be used to understand mathematical identities in teaching and learning?

Some of the data for this dissertation was generated from my teaching journal, which I have kept for years, though the entries are sometimes sporadic. They include pictures, anecdotes, screenshots, and text.

To understand my students' perspectives about being in my mathematics classroom, I conducted interviews with five former students of CST mathematics, all of whom had taken the course within the last two years. The data was collected over the Skype™ platform by video and audio recorded using the iFreeSkype Recorder™ Software. All participants were eighteen (18) years of age or older. The interviews involved questions generally aligned with the stages of *currere* that I would be following during my own regressive, progressive, analytical, and synthetical stages. These questions included: 1) querying the participants about their current education or work, and having them recall their past experiences and feelings about learning mathematics, 2) asking participants to describe what they consider to be a mathematician or someone mathematically competent, and how they use mathematics in their lives now; and, 3) interacting with three media clips from the show *The Big Bang*

Theory as a prompt for further follow up questions regarding the images presented onscreen, including questions about self-identifying (or not) with the characters.

Once the interviews were transcribed, I conducted a rhetorical analysis of both my journal entries and participants' the anecdotes, interpretations, and memories. A rhetorical analysis is not a narrative analysis. Rather, rhetorical analysis is about *how* one makes contentions rather than *what* the arguments might be. In Britzman's (2009) words, looking to the worlds created by teachers who educate in the ways they were educated, learning about how the multiple worlds of education "cut short the ways we imagine education...[leads to] putting the very thought of education... on the couch to invite free association and then read into its congealed matters" (p. 3). To that end, I am interested in the rhetorical features of my vignettes alongside the text that emerged from the transcribed interviews conducted through the *currere* stages with my former students. Drawing on the tradition of rhetorical analysis explicated by Shoshana Felman (1987), teachers need to direct their pedagogy towards students' "unmeant knowledge" (p. 77). This is the unconscious that is both articulated and hidden in teaching, which is critical because "teaching, like analysis has to deal not so much with lack of knowledge but with resistances to knowledge" (p. 79). In reading the vignettes and responses, I hope to begin understanding the resistances and absences that become part of the "unmeant knowledge" in mathematics learning through understanding the patterns of rhetoric in the texts in this study.

Rationale for using *The Big Bang Theory* as artifact

Why would I use *The Big Bang Theory* as an artefact to investigate students' and teachers' relationships with mathematics? First, in order to begin the difficult conversation that invites learning about our mutual experiences of love and hate in mathematics, the television show breaks the ice. As a show about the joys and anxieties of being mathematical, among other things, it stands in for a host of potential similar emotions called forth by researcher and participant alike. How might the show trigger childhood fantasies of mastery in me? Are these transferred into my teaching? - Possibly! What countertransference occurs from the participants who were my former students? Rather than ask these difficult questions about *me* by confronting the participants about their experiences in *my* classroom, it became easier to talk around the themes in the television show that, although stereotyped, play into common tropes of learning, absorbing, and representing mathematical knowledge.

Using this show provided a way-in to have important mathematical discussions about past, future, and present associations with mathematics. As such, Screenplay Pedagogy (see Chapter 4) as an audience response method open to rhetorical analysis became available. While other mathematical artifacts located in popular culture might influence participants, I am interested in a response provoked by television viewing.

As a point of clarification, even though *The Big Bang Theory* seems to be specific to physics, this is a form of applied mathematics, and the tropes associated with mathematicians apply to this show. Additionally, I have watched several films and clips and used a few of them in my teaching as a pedagogical technique to provoke discussion with my current students. As a classroom teacher, *The Big Bang Theory* was the only

show that sparked discussions about applied mathematics and its relevance. My students spent an entire fifty-minute period this past school year debating the use value of mathematics and their relationships to it (particularly applied contexts from taxes to buying a car to calculating things at home; namely, the physics of everyday life). The availability and commonplace nature of the show (many episodes, students have seen all or several before, can name the characters) helped to spark discussion right away.

In terms of a research method, the clips are short, playful, and easy to engage. While of interest to me, and no doubt texts that I will use as I think about my own transferences, for the age range of my participants as recent graduates, *The Big Bang Theory* offers a significant object of engagement. Even though the clips I have chosen are quite brief, the show is a cult classic and has cultural appeal. And with that, no other show bleeds “youth contemporary culture” as profoundly as this one.

Finally, mathematics and physics are intertwined in the Math CST curriculum in Quebec. Specifically, of the two final exams students have to write, they have to solve a Situational Problem – a large real-world problem of dimensions, often with physics and/or graphical components, and always with a cost analysis. Separating mathematics from physics is artificial.

Dissertation Outline

This dissertation charts the journey of a research project with former students of CST mathematics. The next chapter is a literature review of three areas of research that underpin this study: curriculum studies and *currere*, psychoanalysis in mathematics

education, and cultural studies and mathematical discourses. I explore how curriculum studies has been used as both a pedagogical frame for past research; how psychoanalytic readings of individuals experiencing mathematics in a variety of contexts has been used to understand the attachments and desires people have; how cultural studies has traditionally been concerned with the types of discourses that penetrate educational life, and specifically how mathematical discourses influence learners' perceptions of themselves.

The third chapter of this project helps to situate the later analysis of my journal entries and participant responses to the interview questions and to the television artefact. In chapter three, I frame this project theoretically to understand the psychoanalytic concepts of transference and countertransference that help to read conflicts in the unconscious. To do this, I offer a description of the typology of defences typical of mathematics (Nimier, 1993). I argue that using this typology is only helpful if situated within a larger framework describing the interplay between the space of declarative knowledge (statements that reflect unconscious defences) and implicit knowledge (the intersubjective space of the classroom). Drawing on the work of Radford (2008) and Lewkowich (2014), my work is driven by the possibilities offered by engaging with desires, fantasies and anxieties in teaching, and how talking about mathematics allows teachers to understand the challenges of instructing. As well, the use of *currere* considers how we might theorize our past learning to help understand our learning futures, and to question the relationship between in-class mathematical experiences and the life of mathematics outside the classroom.

Grounding my theoretical framework in the psychoanalytic concepts of transference and countertransference, I also engage the notions of *implicit relational knowing* (Stern et al., 1998) and *mutuality* (Benjamin, 2004) to provide a framework for how we might understand statements made by participants regarding their feelings about mathematical learning intersubjectively. In this theoretical framework, I describe how the curriculum concept of *currere* will be used to structure the rest of this dissertation through its four stages. The dissertation thus becomes a pedagogy of curriculum studies itself.

I transition to the fourth chapter, carrying the concept of *currere* as a methodology over from the theoretical framework, rearticulating it as a lens to unpack the past experiences and future imaginings of participants in the progressive and regressive stages respectively. Also in this chapter, I outline the research method including participant selection and interview process for each person. A summary of each episode of *The Big Bang Theory* is included in this section and a description of the data collection method is explicated. Attention is given to the analytic method that will be used in subsequent chapters, and the strengths and limitations of the study are outlined.

The remaining chapters represent the stages of the *currere* method whereby the interviews will be read rhetorically through the progressive, regressive, analytical, and synthetical moments. Chapter six, the regressive moment, involves rhetorically analysing the interviewees' responses to questions about their educational pasts and understanding their statements through the defences offered by Nimier (1993) as well as how they move with and through the intersubjective space. Chapter seven, the

progressive moment, follows the same method as chapter six; however, participants are asked about the future moment and their use of/feelings about mathematics as young adults embarking on lives outside schooling. Chapter eight is the analytic moment and participants view the clips from the *Big Bang Theory*. Following the viewing, they describe their attachments or rejections of the characters they watch onscreen as well as make commentary throughout as it applies to their past, present or future selves. These responses were coded for repetitions of language and then read using object-relations theory. Chapter 8 is the final stage of the *currere* process but stands apart from the other chapters in its total synthesis of the dissertation's research. It is here that I explore what was learned about former students of CST 10's conflicts in the psyche about learning mathematics in Quebec in this study, and what we learn about subjectivity and intersubjectivity. All of the research is consolidated in this chapter with attention to the dynamics that were revealed between the unconscious, intersubjective space, and larger discourses that are part of society. Also part of this final chapter is a section regarding the contributions of this study to the larger field of research about mathematics and curriculum studies in Canada.

Chapter 2: Review of Literature

...the problem of studying the curriculum is that we are the curriculum.

(Grumet, 1981, p. 122)

The purpose of this literature review is to organize three intersections of research in order to understand how teachers and students represent their mathematical identities. The first area is Curriculum Studies. With its emphasis on autobiographical renderings of the learning experience, *currere* research in particular has revealed how individuals think and live through their past memories of learning (and in many cases, not-learning). In addition to outlining some of the ways *currere* studies offers a methodology whereby participants' free-flowing thoughts become a curriculum, this section further outlines the body of mathematics education scholarship that relies on stories about the lived experiences of mathematics in specific historical and societal contexts.

The second section, educational research using psychoanalysis, questions the idea of instrumentalism in learning by asking how all learning is about “affective life” (Britzman, 2009, p. 58). Education takes as its objects people who are subjects, and the learning and teaching of mathematics in particular can be fraught with resistances and unconscious defences. The research in mathematics education that uses psychoanalysis provides a glimpse into the psychic dimensions of love and hate in relation to students' lived curriculum of mathematics learning.

The final section of this literature review takes up cultural studies perspectives of mathematics learning because there are several places from which representations of mathematics emerge in society. Popular culture is part of a larger signifying system, and

is featured throughout this literature review, but is not a category unto itself.

Curriculum Studies: The role of *currere*

Curriculum Studies is a field that provokes our thinking about what goes on in and outside of schools. It is also a field that, over the past half a century, has moved from being primarily preoccupied with the development of particular curriculum objectives and standards, to a field concerned with a number of different things. Chambers (2003) notes that “Canadian curriculum theorists, working at universities, located in specific provinces (with their own curriculum) are challenged to interpret what is curriculum at this time and place?” (p. 223). Invoking the counterpointed storytelling and musical inspiration of Glenn Gould’s *Idea of the North*, Ng-A-Fook (2014) asserts that the “very idea of Canadian curriculum studies is bound together by stories of counterpointed historical movements” (p. 13). With its emphasis on historicity, Canadian curriculum theory focuses on a broad array of educational experiences. Pinar (2010) explains that,

...curriculum theory testifies to the progressive insistence that education have value for society and the self, that its end is not only itself, but rather, that it must engage and extend the interests – intellectual, psychological, social – of students... [C]urriculum theorists in the university regard their pedagogical work as the cultivation of independence of mind, self-reflexivity, and an interdisciplinary erudition. They hope to persuade teachers to appreciate the complex and shifting relations between their own self-formation and the school

subjects they teach, understood both as subject matter and as human subjects (pp. 268-269)

Given that the ever-changing historical moment underpins much of the inquiry into what educational significance school subjects have at this time and place, Canadian curriculum theorists derive much inspiration in their work from the importance of place and our relationships to the land and its troubled colonial past (Donald 2012, Smits, 2008). Looking at what is refracted back as we look at our relationships with the different landscapes, languages, and cultures that make up our Canadian geography, Ng-A-Fook (2010) calls this the “autobiographical demand of place to which we must account and to which we must become accountable” (p. 44). As an urban teacher from Alberta, newly located in National Capital Region, my research journey takes me forth into what I first considered the “wilds” of West Quebec – an enclave of Anglophone culture, people who speak the rural dialect of Ottawa Valley Twang, and the longstanding farming heritage of this community. Thinking about how I might have appeared to my new charges as a mathematics teacher from “outside,” I now consider another view of curriculum studies:

...how your life history, politics, gender, race, and theology have come together in complicated ways to make a problematic situation. The field no longer sees the problems of curriculum and teaching as “technical” problems, that is, problems of “how to.” The contemporary field regards the problems of curriculum and teaching as “why” problems. Such a view requires that we *understand* what was before considered only something to be solved. (Pinar, Reynolds, Slattery, & Taubman, 2004, p. 8)

While it is clear that the concept of curriculum in my new town no doubt involved moving away the concept as restricted to material transmitted in classroom whose aim was to produce conforming citizens that fit into the existing societal regime, I wondered what might be revealed with and through this new place in terms of identities. What might I learn from and about students learning mathematics *here*?

There are a diverse set of methods within Curriculum Studies research, but one of the primary concerns within the postmodernist antiparadigm that rings true for my work is the goal of understanding the “theoretical and institutional” problems of schooling without, “to use a poststructuralist term... a ‘master narrative’ wherein individuals and individuals’ lines of research disappear into the author’s line of reasoning or the author’s ideological commitment” (Pinar, Reynolds, Slattery, & Taubman, 2004, p. 5). Attentive to a desire *not* to impose my urban, culturally, socially, or educationally different framework upon my teaching experience, I began to learn about my students in the classroom through their mathematical experiences. In doing this research as a new curriculum scholar whose work rubs against the work of others, intersects, and even opposes methodologically or conceptually the nature of the human experience in schooling, I learn that curriculum studies is a “mosaic...quilt...a complicated symphony” (p. 5). One of the main research methods within the field that invites an exploration of education through critical self-reflection and exploration is *currere*. And it is to *currere* I turn here in my research for a number of reasons, some of which I introduced briefly earlier.

Currere, as introduced by Pinar in a collection entitled *Curriculum Theorizing: The Reconceptualists* in 1975, “became the word that announced [its] method” (Sumara,

1996). While I will outline how *currere* works further along in this literature review, it is foremost concerned with furthering the understanding that curriculum as a relationship between the lived experiences of individuals and their worlds in educational settings. Disrupting the conception of “curriculum” as a “thing,” an “objective” it moves towards the notion that curriculum teaches students to act sensitively, thoughtfully, and courageously in society – with a larger commitment to societal responsibility. Curriculum changes as history changes and becomes a process, a social action. To that end, *currere* “involves investigation of the nature of the individual experience of the public: of artifacts, actors, operations of the educational journey or pilgrimage” (Pinar, 1975, p. 400). Sumara (1996) explains further:

By reconceptualizing curriculum as *currere*, attention was diverted from the artifacts of curriculum (documents, content, methods, strategies, teachers, students) to the *relationships* that bound them together and to the way these relationships evolved as they moved through time and space (p. 173, emphasis mine).

Thus, as we seek to challenge the hidden curriculum of normative practices upon which schooling is built (imperialism, patriarchy, white supremacy), *currere* is about reclaiming education as a journey toward understanding the self in a system that reduces education to schooling, “and schooling gets reduced to best practices designed to control what and how we know” (Baszile, 2017, p. vii). One of its strengths is to help us “identify subconscious thoughts and patterns of thinking that explain our actions, and with this awareness, we can work to decolonize both our thinking and our actions” (p. viii).

Like many studies that have come before it, this dissertation is derived from the lived experiences and those of my students. For the mathematics classroom which is the site of this study, it is relevant to think of Aoki's distinction between the curriculum-as-plan and curriculum-as-live(d) as formative in understanding reflexive practices such as thinking through past mathematical experiences as they come up against the planned curriculum of algebra, geometry, and functions. Aoki (1986/2005) describes how curriculum discourses mediate meanings to offer particular landscapes for how individual subjectivities come up against the discourses that permeate that curriculum. In asking how my praxis might be "a way of knowing in which the subject within a pedagogic situation (like a classroom) reflectively engages the objective world" (Aoki, 1983/2005, p. 116), I wonder how my history of living and being with mathematics enters the pedagogical space. In mathematics education research employing a curriculum studies lens, this questioning is what Witz (2000) describes as a path along which the self traverses, unfolds, opens, and deepens. How might individual histories about mathematics learning enter the present teaching space? Witz questions whether sharing of these stories always result in mutual understanding. Handa (2003), using a curriculum studies lens, assesses the individual lived experiences of mathematical learners and teachers in which he follows "threads" to ask "what is at the heart of mathematical engagement? Or, what is the meaning derived from such activity" (p. 22)? These threads include "frustration as deception" and "frustration as disappointment" which lead to new ways of understanding how individuals view their mathematical experiences through their weaving that becomes a mathematical terrain.

Appelbaum (2008a) writes about his reading of youth science fiction as the starting point for a “systematic and self reflective study, using youth culture texts to interrogate the relations between academic knowledge and one’s own life history, in the interest of both self confirmation and social reconstruction” (p. 3). In doing so, he asks himself about the mutual concern about possible futures that both science fiction and curriculum studies take up. Self-reflexively, he posits that such work destabilizes curriculum studies, asking “who are these interlopers that I place at the center of the curriculum theory landscape?” and “what are the implications of [arbitrarily selecting literature] given the expectations of systematicity and coherence in academic scholarship?” (p. 4). These are both important questions as I use a popular television show, *The Big Bang Theory*, as one such interloping text into my study. However, spurred on by Appelbaum’s resistance to the “methods fetish” whereby certain methods are given priority and prevalence as best ways to unpack educational issues, I am inspired his use of science fiction as a way of “weirding and poaching” curriculum, a resistance to technical solutions that solve education’s primary problems. Appelbaum is able to uncover the reality that “methods are social constructions that grow out of and reflect pedagogical implications of asymmetrical power relations among different groups” (p. 7). In this study, using a popular television show as the starting point to enter the conversation about so-called subordinated students (those in “low mathematics”), I might ask how commonplace methods of teaching alongside methods of researching students’ experiences of success or failure merely reproduce asymmetrical power relations. If an interloper such as popular television might be one way to understand the concept of what learning, success, and pedagogy means to such a group of students, then I might be doing the work of a curriculum worker as Appelbaum

suggests, to understand the complex skills, thoughts and beliefs students have in a world where they are equally immersed in popular culture alongside the pursuits of conventional schooling and classrooms.

Returning to *currere* as a method that is also an “embodied social and cultural practice” (Appelbaum, 2008a, p. 10), I can begin to unpack Pinar’s original method more clearly. Noting in the 1970s how curriculum had forgotten about the individual, Pinar called for a reconceptualization of curriculum as autobiographical text. *Currere* means to “run the course” or “running the race” (Schubert, 1986) and its method looks at “the individual’s own capacity to reconceptualise his or her autobiography.” *Currere* therefore is curriculum redefined through individual experience. Pinar (2012) explains that *currere* is:

...[a] sketch of subjectivity-structured temporality (reactivating the past, contemplating the future, in so doing complicating the present), this method is no defensive effort at psychic survival, but one of subjective and social risk, the achievement of selfhood and society in an age yet to come. To undertake this project of social and subjective reconstruction, we must remember the past and imagine the future, however unpleasant each domain may prove to be. (p. 5)

Doerr (2004) emphasizes that the methodology of *currere* “focuses on the educational experience of the individual as reported by the individual; it seeks to describe what the individual himself/herself makes of behaviors” (p. 8). According to Kincheloe (1993), it describes the experience as a “transcendence of egocentrism” whereby students engaging in the *currere* process can see themselves “how they are and how they wish to

become” (p. 138). Kincheloe stresses the value of working through the *currere* process with teenagers because of the pressing need for “intrapersonal understanding” at times when student stress and suicide rates are high (p. 141). By asking students to reflect on their past histories and memories, they gain the skills to self-analyse and understand external and internal motivations and influences in ways that are positive and constructive.

What is the *currere* process and what are its stages? Pinar (2012) emphasizes foremost that it is a “sensitivity [that] can become precious to educators committed to their – and their students’ – ongoing self-formation” (p. 45). The steps he describes are as follows:

- (a) The *regressive* step is meant to “stimulate memory[;] one free associates, after the psychoanalytic technique, to re-enter the past, and thereby enlarge – and transform – one’s memory” (p. 45).
- (b) The *progressive* step “imagines possible futures, including fears and fantasies of fulfillment” (p. 46).
- (c) In the *analytical* step, “the student examines both past and present...wherein we attempt to discern how the past inheres in the present and in our fantasies of the future.” (p. 46)
- (d) The *synthetic* step consolidates the fragmented parts of the experience of education by taking into account the social and societal context of the individual experience. Quoting Mary Aswell Doll (2000, p. xii), Pinar (2012) explains that “[c]urriculum is also A coursing, as in an electric current. The work of the

curriculum theorist expresses this intense current within, that which courses through the inner person” (p. 47).

These stages have been used by scholars such as Doerr (2004) working with students directly. Doerr (2004) embarked on a journey of Environmental Autobiography in a semester-long course with her students who were first asked to reflect on two quotations, one from Freire and the other from Grumet. They were encouraged to pull apart the idea of the self-as-knower-of-the world (Grumet, 1976, p. 38) and ask themselves about the role of education in transcending false consciousness. At first, the students were unable to go beyond superficial responses; however, over time, students were able to reach back and draw upon past memories that informed their way of thinking about place and education and the role of memories in forming themselves as learners. In similar work involving memories, Casemore (2010) worked with teens, teachers, and sex educators, and used free association in conjunction with the film *Desire* (2005) to understand conversations about adolescent sexual health. He analyses the free associative language that emerged from focus groups, using the film to “prompt conversation ... [to] center the conflicts, uncertainties, and wishes that surface or unconsciously hold sway as adolescents shape identities, forge relationships, and come to terms with their changing bodies” (p. 309). Reading the free associative language in three cases, Casemore points to “juxtapositions of ideas or chains of ideas that introduce counter-thoughts and, therefore, make available for consideration the force and significance of the speaker’s unconscious thinking process” (p. 309).

In the present study which is focused on students’ relationships with mathematical teaching and learning, I hope to likewise “identify chains of intersecting

and diverging thought that invite consideration of the affective and interpretive functions of free association in an individual's self-expression" (p. 311). The rhetorical space occupied by the self-representational statements of my participants, in their juxtapositions or contradictions, might also lay bare the emotions and memories of past educational experience and future longing.

The purpose of *currere* is fourfold according to Kanu and Glor (2006). Speaking to the potential for teachers to use the method, they first explain that by examining past and future, and then analysing and synthesizing the moments, teachers can develop a collective autobiography. This enables them to "enter into the collective to begin the process of acting on their environment with the idea of a possible future" (p. 112). Second, teachers begin to have a voice within or against the system and implement transformative change. Third, *currere* might enable educators to see that they have knowledge that informs their work as educators, and by examining it critically and valuing it, are able to enact change. Finally, *currere* recognizes public and private spaces in teaching. Kanu and Glor explain that "[t]he examination of personal narrative creates a connection between private and public that is missing within the current fragmented education system" (p. 114). I would contend that all of these aims prove to be valuable in studying mathematics education in Quebec. As an educator, the process of looking at one's own educational experience negates the idea that many years ago when I first entered the classroom, I was a "blank slate." Instead, the journey of my own teaching informs how I approach my students, and using the *currere* process can help unpack my journey as a learner who teaches other learners.

Using *currere* to understand the mathematics classroom, Davis (1996) suggests that "in spite of our efforts to prescribe understandings, the mathematics of any given classroom setting will likely diverge in some way ...as teachers and learners interact, ...they establish their own body of knowledge" (p. 92). In other words, we all come to the scene of teaching and learning mathematics with a prior relationship to the subject, one that is influenced by memories and experiences that are unearthed in learning and teaching, and one that is changed on account of our interactions with others. In his original method, Pinar asks us to contemplate the questions, "What do I make of what I have been made of" (p. 204)? As I write, read, and learn from the stories that I tell, I am better able to understand the self, what Miller (2005) calls "multiple identity constructions" (p. 50). Autobiographical writing makes available multiple interpretations of experience, such as the ongoing process of learning mathematics and becoming mathematical. The writer "recognizes the constructing and reconstructing of experience and identities as interpretive" (p. 56). To that end, I can learn a lot about my present life as a teacher by writing autobiographical stories— of my childhood, my frustrations, my experiences about mathematics. I can similarly learn from my former students how they write and rewrite the self in relation to mathematics.

This is to say that within curriculum studies, stories from both teachers and students are key. Mendick and Moreau (2014) describe the stories students tell about their relationships to mathematics through their engagements in society. The authors use television shows and movies as artifacts which, when analysed as public discourses, articulate different kinds of stories about mathematics in relation to learners. Students write themselves against the tropes of mathematicians as having natural ability, of

mathematics as abstract or solitary, and, contrastingly, mathematics as open and accessible (in video gaming, shows like *Deal or No Deal*, and everyday life experiences like banking). They define stories quite simply as “ways of seeing and making sense of the world” (p. 18). In one example that struck me, Bibby (2002) presents the stories of primary school teachers in terms of the emotional terrain of shame in response to criticisms about the ability to do and teach mathematics, revealing that stories about the self can often be difficult and influence one’s place in the pedagogic world of what it means to be a competent teacher. My study relies on some of these same tropes, whereby students also read themselves against societal discourses of competence, seeing themselves mirrored in some of these same ways. I will outline the ways in which the everyday life of doing mathematics comes up against the classroom space and expectations for both my former students and me.

Brown, Brown, and Bibby (2008), in an article tellingly titled “I would rather die: Reasons given by 16-year olds for not continuing their study of mathematics,” investigate the key words students use to describe their experiences, concluding that enjoyment is the key factor that influences students’ decisions to continue studying mathematics. Similarly, this research will unpack the language that underpins former students’ experiences of learning inside and outside the classroom, whether students continued mathematics after high school or not.

Studying the compulsory relationships people have with mathematics in school, Boylan and Povey (2009) explain the value of “storying the self” to learn

how people themselves make sense of their experience of being in the world...
[which] includes the relationship between a complex phenomenologically
interior world [of doing mathematics] that frequently has hidden or
unconscious, and invariably emotional, motivations and causes, and articulated
human choice. (p. 47)

I might ask what kinds of other factors are at play that influence how Canadian students like mine negotiate their place in the world while working through seemingly abstract calculations in their heads and on the page. Looking at the historical influences that exist alongside the interior world of learning and doing mathematics in the Canadian context, Donald, Glanfield & Sterenberg (2012), conducted research related to student performance in mathematics amongst First Nations students in Alberta. They ask how colonial histories become part of the lived curriculum, asserting, “we have come to wonder about the authority of researchers, the authority of mathematics, and the authority of culture. We have come to understand how easy it is to replicate colonial logics as authoritative and have encountered conflicts within ourselves when resisting these stances” (p 53). Looking at how culture influences mathematics learning in the Chinese context, Ma (2014) similarly describes the resistance to curriculum change in Elementary classrooms in China due to a lack of research on the effects of new curriculum implementation in mathematics. Taking note of a wide variety of concerns, English and Mulligan (2013) question the things which constitute a young person’s mathematical world-orientation to the importance of understanding Indigenous mathematical thinking. They reconceptualize curriculum studies and mathematics in an effort to move away from studies in counting and arithmetic. Similarly, challenging the

normative domains of the field of Mathematical Knowledge for Teaching (MKT) as simply a forum to prevent errors in mathematical teaching, Sleep and Ekelson (2012) take a curriculum studies approach that allows for teachers to provide a “rich representational context for mathematical work” (p. 537). Considering the context of K-12 teaching in the USA, where most teacher-education students take mathematics classified as either “remedial” or “introductory,” Gordon (2011) outlines a new program to break free of historical paradigms of mathematics incompetence by “constitut[ing] the set of actions that have enabled the mathematics community in its creative and dedicated past to make connection between what is known and what is being sought represent[ing] the collected wisdom of what is worth doing mathematically” (p. 458). Some lived histories have been examined in a transdisciplinary context, such as the work of Canadian curriculum scholar Khan (2012), who asks how popular representations of mathematics, through disrupting normalizing discourses about the capacity of students to learn difficult concepts, nevertheless reinforce economies of power/knowledge that employ colonizing and Othering practices within the classroom and amongst marginalized students in particular. In all of these cases, mathematics learning is understood through a curriculum studies lens whereby the life worlds of teachers and learners is critical.

It is clear that *currere* is being employed within a broad range of studies in Canada, indicating its wide applicability as an autobiographical inquiry method. In searching *Library and Archives Canada*’s online database of theses, there were twenty-one (21) other theses or dissertations in the Canadian context that take up the concept of *currere* as of March, 2017. These spanned a variety of areas including journeys of one’s

own learning, self-care, or in relation to place and space, such as mother's gardens and the landscapes of Northern BC (4 studies); a/r/tographic techniques that ask what "productive entanglements" emerge from song, photography or art and also reflective journeys of being a non-aboriginal teacher in the North (3 studies); *currere* studies that focus on otherness in media (particularly in relation to Muslim women) and others seeking ways to understand personal histories in transnational contexts (3 studies); projects that used feminist emancipatory performance art, investigate taboos as spaces of silence to ask what is tolerable queerness (2 studies); studies which investigate individuals' environmental consciousness and feelings of civic responsibility in relation to the land (2 studies); and lastly, studies that ask about various particular specific communities – such as elementary school students, early childhood environments, English classrooms, forest schools, or communities identified as at-risk (5 studies). In all of these cases, there was a drive to uncover the voices and lived experiences of participants that became the basis of a *currere* autobiographic inquiry. Methods varied, from collecting journal entries, poetry, photographs, interviews, and texts to name a few. But the threads that tie these studies together is a focus on how either the author's or the readers' biographies come up against existing theories, images, contexts, or narratives located in education. Notable in these theses and dissertations is the absence of a study with a mathematics focus in the Canadian context. However, given the diversity of applicability of *currere*, my focus on mathematical experiences in Canada, and specifically in Quebec, points toward both the possibility and the need for this research.

While *currere* is not used specifically in studies that do focus on mathematics, there is a heavy use of personal narratives largely in the British and American contexts

(see Black, Mendick, and Solomon, 2009 as one example of a collection). What I find notable about the use of autobiography in curriculum research in mathematics education is that stories become the affective representations of mathematical experiences. Affect works along two definitions – the emotional responses conveyed in language in the story, and also as a verb – to be affected, or acted-upon. Given that individuals do not create emotions but rather “feel” them, stories become the ways people convey being “done unto.” Curriculum Studies research is often focused on how stories can work back as reflexive pieces to help researchers and students understand themselves in the learning space. Mathematics learning becomes an affective experience – somehow the concrete rational calculations nevertheless evoke deep emotions that are relayed in personal narrative that can be read and understood part of the relationship to teaching and learning.

Returning to Casemore’s (2010) paper mentioned earlier, I would like to point out the way in which he employs free association in relation to the viewing of films by undertaking a close reading of participants’ language about sex education that “strays from the narrative focus or rhetorical purpose to admit other – seemingly irrelevant or contradictory thoughts” (p. 309). He then approaches these thoughts “psychoanalytically, as representations of idiosyncratic and unconscious mental connections between ideas” (p. 309). The reading of speakers’ unconscious thinking processes in Casemore’s work is a form of rhetorical analysis that “lay[s] bare an unconscious logic” (p. 310). In curriculum studies, the use of autobiography/stories, read rhetorically, then affords us opportunities to understand chains of ideas, seek logics, and uncover what might be unsettling us in the scene of education. To that end, individuals’

stories, told in journal entries or unscripted interviews, can be the places where rhetorical analysis of free associative thoughts can take place.

In other studies that investigate how the viewing process might activate feelings of pleasure and anxiety, enjoyment or loss, Robertson's (1995) methodology of Screenplay Pedagogy has been of prominent importance. Designed for use in educational contexts, Screenplay Pedagogy is a psychoanalytic audience-response method invented by Robertson (1995) to study how responses to Hollywood "teacher movies" reveal unconscious desires about teaching amongst primary pre-service teachers (also see Brunner, 1994; Mitchell & Weber, 1999). She examines the dynamics of spectatorship, whereby "spectators construct meanings during the film viewing (or 'reading') process while at the same time the film constitutes and engenders them as social and psychological subjects" (p. 26). Furthermore, she employs psychoanalysis "to interpret not only the contents and structures of films, but also how readers incorporate these structures into social practice" (p. 26). This dissertation research, using both autobiographical stories through the free associative *currere* process and television to activate discussion about popular culture discourses, will rely heavily on Robertson's method.

A Screenplay Pedagogy study can be set up by having viewers of a similar demographic watch a film about teaching in a closed setting. For Robertson (1995, 1997, 2004) these were female, primary pre-service teachers who watched a film featuring female teacher protagonists; for Aitken & Radford (2012) they were Canadian male and female students using digital storytelling to understand their symbolizing experiences in the classroom; for Trier (2003) and Tillman & Trier (2007) they were

male and female preservice teachers who viewed school films where racialized identities are at the forefront of conflict in the classroom and amongst school staff. Though not using Robertson's technique exactly, Mendick and Moreau (2014) undertook similar work, interviewing hundreds of high school students responding to television and filmic representations of mathematics to understand "the stories people tell about mathematics and about themselves in relation to it" (p. 18). In reading through the literature, this study might be the first to employ Screenplay Pedagogy as the method to understand participants' relationships with learning mathematics. In so doing, this study opens up an inquiry into how popular culture – a show like *The Big Bang Theory* – might be the place from which to speak with and through the learning of mathematics from childhood until the present. That is, if the scene of learning mathematics might be where transference and countertransference occurs, looking analytically at audience responses might provide a psychoanalytic window into individuals' specific educational histories.

Common to the ways Screenplay Pedagogy has been used in the previously named studies, participants and researchers engage in personal reflection, journal writing, and participate in videotaped and transcribed discussions or interviews about the meanings they derive from films or television representations. With this in mind, an analysis can take place about general "problems of power, pleasure, and oppression in schooling" (Robertson, 2004, p. 79). These signal "trouble around the text" (p. 81) where the moments of transference and countertransference occur. In Robertson's work, responses are read to understand how "aesthetic modes of address [challenge] deeply held phantasies about teaching and social relations" (p. 82). Examples include responses where teacher candidates turn away from the portrayal of disengaged or dangerous

teachers onscreen (see Robertson, 2004) or where they are drawn to teachers who rescue their students by going “above and beyond,” garnering their love and adoration (see Robertson, 1997). In this study, former students of mathematics 10 were encouraged to look at their experiences as different or akin to those they view onscreen. I was mindful of the possibility that the show itself might influence individuals’ views of themselves as learners – namely that watching the show is not merely part of the study but has a life of its own in the world of the participant.

In both the work of Robertson and Casemore, the type of language, repetitions, and thoughts of participants are the core of rhetorical analysis. The method in both cases relies on the language of psychoanalysis to answer questions about identity and subjectivity. In order to fully understand why, and to uncover the ways in which a vocabulary of psychoanalysis is critical to this study, I now provide a brief review of psychoanalysis in education and in mathematics education literature.

Psychoanalysis and Educational Research

While research in curriculum studies provides the historical and societal context for mathematics as a lived curriculum beyond the internal world of completing calculations, an emerging field has begun to establish the psychic dimension of mathematics identity formation. Through this research, we begin to understand how the unconscious is affected by encounters with mathematics and how this influences the subjectivity of learners.

Taking up the workings of the unconscious mind is the primary task of psychoanalysis, and to that end, the field addresses ontological, epistemological, and methodological questions alike. Fundamental ontological questions about the self include: Who am I? What is reality? And questioning the self leads to epistemological questions about subjectivity: What do I take as truth? How do I know that I know something (Rallis & Rossman, 2012, p. 30; also see Crotty, 1998; Grix, 2004)? Methodologically, psychoanalytical inquiry takes up these questions in the form of clinical practice, psychoanalytic criticism, and textual analysis.

What education lacks, even through its most emancipatory objectives of social justice (Freire, 1970; Shor, 1992), is a way of engaging with educational socialization as a psychic process. The ambivalences and resistances within the subject might be best encapsulated in the words of Elizabeth Ellsworth's (1989) students who bemoan, "Why doesn't this feel empowering?" In other words, it is important to trace the ways power and ideology in education hail and interpellate students and teachers, forming subjects who cannot exist outside ideology (Althusser, 1969, 1971). Indeed, we are pressed to account for the ambivalences and resistances in education perhaps by considering what Althusser (1971) describes as a war on children,

who, projected, deformed and rejected, are required, each by himself in solitude and against death, to take the long forced march which makes mammiferous larvae into human children, *masculine* or *feminine* subjects (p. 206, original emphasis).

To put it briefly, education is caught between the pull of ideology and the desires of the individual – a tension between the concept of self and the context we call the social. These are the two facets which constitute subjectivity, namely the movement of the subject from an originary state of nature to one of “culture” – from “mammiferous larvae” (an “it”) to a knowing “he” or “she” subject. The processes of this transformation are at the core of psychoanalytic theory. In the following section, I will provide a theoretical road map for the concept of *subjectivity* in order to outline the implications of a psychoanalytic epistemology in education.

There is no easy way to define “subjectivity.” Locating a concept of the human self in the context of its experiences is a philosophical and sociological challenge complicated by the problem of distinguishing what is meant by “subjectivity” rather than “identity.” To begin, subjectivity might generally be considered our sense of self, our unconscious and conscious thoughts, and our sense of who we are (Taylor, 1989; Woodward, 1997). We experience our subjectivities in social, linguistic, and cultural contexts. The discourses which define these contexts “recruit subjects” (Woodward, 1997, p. 39) and the positions we take up and identify with become identities. Identities are “the relational aspects that qualify subjects in terms of categories of race, gender, class, nation, sexuality, work, and occupation, and thus in terms of acknowledged social relations and affiliations to groups” (Venn, 2006, p. 79). I am aware of the danger of distinguishing wholly between subjectivity and identity. Naming these categorically as “subjectivity versus identity” creates a binary. By privileging subjectivity, a hierarchy emerges: what about those who cannot self-reflect or who are emotionally unaware?

Privileging subjectivity as inherently self-reflective disadvantages those who are able to undertake this process of being self-critical.

As well, I note that subjectivation privileges the interiority of the subject as the location for meaningful analysis. Judith Butler (1990) contends, “the reconceptualization of identity as an effect, that is, as produced or generated opens up possibilities of ‘agency’ that are insidiously foreclosed by positions that take identity categories as foundational and fixed” (p. 147). Butler argues for gender as a kind of mandatory performance but whose individual types of performances indicate agency and create identity. To that end, the concept of “learner” within education can be conceptualized as a kind of mandatory performance. However its differences in repetitions (not all learners are the same nor do they act (create identities) the same way) amounts to the creation of agency in the learning space.

This general distinction between subjectivity and identity provides a starting point to ask what the relationship might be between essentialist notions of identity and the psychic and political demands for identity. For example, how might rights groups with urgent, emancipatory agendas (women, Blacks, gays, for example) who rely on the solidification of identities in the face of political or historical strife, come up against the psychoanalytic concepts of the unconscious or divided subject? Is the subject necessarily determined and fixed by social (including educational) and cultural “forces”? Smith (1988) helps to define this problem:

[I]n psychoanalytical discourse [subjectivity] will take on a more specialized meaning and refer to the unconsciously structured illusion of plenitude

which we usually call ‘the self’. Or elsewhere, the ‘subject’ might be understood as the specifically subjected *object* of social and historical forces and determinations. (p. xxvii, original emphasis)

Mühlhäusler and Harre (1990) stress the agency of the subject, arguing for the subject’s “Double Location.” The subject masters linguistic and social practices within his or her social context, and this mastery constitutes a theory. As such, “the ‘self’ is not an object, but the *leading concept of a theory* about what it is to be a person in one’s native culture” (p. 89, emphasis mine). However, this view of the subject as a theory leaves open the possibility for subjectivity to be defined by multiple conceptual frameworks of personhood, an epistemology grounded in discursive and sociocultural notions that in some ways neglect the unconscious. Other theorists have been attentive to this, reminding us that the relationship between the unconscious and conscious is a slippery one. The unconscious is always out of reach of our ability to conceptualize it; once thought-of, the unconscious emerges into the conscious. The stability of the individual and his or her subjectivity can thus be questioned (Silverman, 1983; Weedon, 1987, 2004). The subject is divided, and more specifically, divided against itself (Elliott, 2012).

Psychoanalysis and the Subject: A brief review

Any genealogy of subjectivity in psychoanalysis begins with Sigmund Freud, whose theory of the unconscious accounts for the “birth” of the subject.³ For Freud, *repression*

³ In this section, I will take up the major theories of Freud and Lacan. This is not to neglect the important psychoanalytic theorizing by Melanie Klein, David Winnicott, and Wilfred Bion, among others. I have chosen to focus on Freud and Lacan because it is largely out of their theories of the unconscious that other subsequent theories have emerged.

is the mental action that produces the unconscious by making memories, desires, and thoughts irretrievable (see Frosh, 2012; Moore & Fine, 1990; Rycroft 1995). The conscious mind (ego) makes sense of the unconscious (id) through psychoanalysis – a method and epistemology grounded in the assumption that the mind is dual in nature and that conscious thoughts can be retrieved. We have all, at some time, used phrases such as ego, libido, complexes, and repression in everyday language. This commonplace vernacular illustrates the pervasiveness of Sigmund Freud’s theories in the language we use to describe human psychology. Freud named the irrational and unknown unconscious the *id*, and the rational, logical, ordered conscious the *ego*. The ego placates the instinctual, needy, irrational drives of the id. The *superego* consists of external social influences on the drives and is that which influences moral judgements and values that might be in conflict with rational objectives (following religious practices, for example) (Frosh, 2012). The self emerges out of desires, and consciousness acts as a gatekeeper, a kind of censor that regulates unconscious instincts that the consciousness (as ego and superego) deems unacceptable.

For Freud (1957), these repressed desires are infantile sexual desires (Oedipal complex) which symptomatically re-emerge in adulthood as dreams and in language as puns, jokes, and parapraxes (omissions, forgetfulness, slips of the tongue). Since we all have internal conflict over what we want to do (“pleasure principle”) but are forced to postpone these desires (“reality principle”), we are candidates for analysis. Before the repressed trauma emerges as a remembered dream, it undergoes a process of “dream work” (Freud, 1973). This dream-work is the transformation of the repressed into

manifest workable elements for analysis, including dreams, memories, and linguistic slips.

Published in 1966 (English trans. 1977), Jacques Lacan's *Écrits* offers a re-reading of Freud's theories of how the subject comes into being. In particular, Lacan challenges the privileged sexual status of the male in the Oedipal complex to assert that *all* subjectivity is based on loss, failure, and lack (Makaryk, 1997). He transforms Freud's theory from the literal to the linguistic. Lacan describes three stages of the development of the subject: the Imaginary, the Mirror Stage, and the Symbolic. In the Imaginary (like Freud's id), the infant is in its primal state, controlled by impulses and without awareness of physical boundaries. It is in this stage that the infant learns about absence and presence of satisfaction, and this is revealed in language. The infant's sense of oneness with the world is turned upside-down by patriarchal law – the *nom du père* or Name of the Father (literally the father, and also society's patriarchal institutions). This causes Desire within the infant, to return to the utopian Imaginary. Desire must be repressed, and this repression brings the unconscious into being. What Lacan calls the "Mirror Stage" is when the infant recognizes the self in the figurative mirror, and from this emerges a conflict: the visual identity, the body of the infant, has a false wholeness but the subject experiences a fragmented reality. The ego emerges from the identification of one's image in the mirror and the resulting feeling of mastery over the self as a whole; the subject feels joy (*jouissance*). This recognition of self in the mirror is analogous to the process of gaining subjectivity (Bowie, 1991; Evans, 1996).

The Symbolic is the domain of language and representation and depends on recognizing the figurative construction of reality. In the mirror stage, the subject

undertakes a crucial recognition that the image is both the self and not-self. Thus, the subject's entry into the Symbolic is a recognition that the "I" that is spoken is different from the individual that speaks in the first person. In other words, the "I" that is spoken is an ongoing *misrecognition* of the subject as coherent and whole. Located within this misrecognition is the perpetual reminder of the original loss that entered the subject into the signifying chain. As well, the "individual" in the singular cannot be uttered, since we now know that the subject is divided. The subject is subject, if you will, to the Symbolic order that is language (Appel, 1996).⁴

Psychoanalysis attends to the fact that learners have complex subjectivities and that learning can sometimes be immeasurable and uncertain. Bibby (2011) calls this "the love and the hate, the desire and the fear" of learning (p. 2). Nimier (1993) also conducted psychoanalytic works, specifically within the field of mathematics education with students from France, Belgium, and Quebec. He surveyed 1460 students and, of those, interviewed 64 about their abilities, feelings, and interactions with parents about mathematics, concluding that mathematics caused anxiety in different subjects in four different ways: personality loss, destruction, loneliness, and castration. Reading student anxiety first through Freud, and then through Lacan's mechanism of repression whereby the signifier falls to the level of the signified, Nimier discovered that "[m]etaphors

⁴ It is important to note that even though Lacan structures the unconscious like a language, it is not so in the Saussurean sense (a signifier linked closely to one signified) but rather in a post-structuralist view whereby one signifier relates to another along a constantly shifting chain. Lacan describes language as working with the signifier to have power over the signified; this is part of the Symbolic: "This passion of the signifier now becomes a new dimension of the human condition in that it is not only man who speaks, but in man and through man it speaks (*ça parle*), that his nature is woven by effects in which is to be found the structure of language, of which he becomes material, and that therefore there resounds in him, beyond what could be conceived of by a psychology of ideas, the relation of speech" (1977, p. 284). In other words, the Symbolic precedes the subject, and performs (speaks) it, and not vice versa.

(indicating condensations) and associations of ideas (indicating displacement)....[are] anxieties displaced onto mathematics” (Evans, 2000, p. 117). Lacan’s view of the unconscious, where our subjectivities emerge from the entry into language (from the infantile to the linguistic state), provides different ways in which mathematics might be a threat to a unified self. While I fear that a hierarchy emerges in rendering some subjectivities comfortably lacking, those who are unable to compute might be considered as having a different (some might argue lesser) emergence into the world at the level of the unconscious. Brown, Hardy, and Wilson (1993) explain this to the extent that the subject,

analysable as a process, inextricably linked to a context which is a process...[and] held in the successive stories about him, can never be fully constituted since closure is always in the future...Nevertheless, the stories he tells give structure to that which he describes and reflexively give structure and position to he who speaks.” (p. 13)

In other words, mathematics is a form of language that structures the “I” subject as never quite complete (as in Lacan’s “mirror stage”). The object that is mathematics is always Other, not interior to the subject, and yet the subject is formed in and of the language which is mathematics, creating the Desire structured by lack. The lack is a constant striving to enter the world of the Father – in this case powerful, masculine, mathematical discourses. Brown, Hardy, and Wilson (1993) assert that in the quest for structure, the subject narrates a rational universe. In doing so, mathematicians construct an ideology whereby right/wrong answers, numeric testing, and hierarchical knowledge are essential

ways of coming to know the world. They satisfy the lack by providing the subject with mathematical symbols and problems that can be solved.

Drawing on the work of Badiou, Brown (2010) explains the constant striving to alleviate such lack as something which cannot quite be reached by anybody. Thus, in some ways, not only are the teachers of mathematics “subjects presumed to know,” but so are mathematical symbols and operations (Felman, 1982, pp. 7-8). In the classroom, the teacher might be thought to be the subject who knows, or is supposed to know, just as I am “presumed to know” what my students refuse to acknowledge in my opening vignette. Britzman (2011) reminds us that we have an unconscious full of things we are not aware but that these affect us as adults. In my idealization of mathematical certainty (in my teaching of strict formulas with seemingly straightforward quizzes), I bring forth my history of learning as an infant and the beginnings of my dependency that are not in my consciousness but nevertheless transfer into the classroom. Bibby (2011) instructs us that in mathematics learning,

[w]hen we enter an experience characterised by extreme states or certitude – whether of an arrogant omnipotent state of knowing everything with great certainty or of a despairing state of knowing nothing with equal certainty – alarm bells need to ring; something is being defended against (p. 107).

These extreme states characterize education overall, propelled by the fantasy that knowing/knowledge can be “gotten” by the acquisition of discrete facts.

Looking beyond Freud, Black, et al. (2009) use the theories of Melanie Klein (1930, 1946) to describe a student, Nikki, who splits mathematics (as an object) into

“good mathematics” and “bad mathematics.” To explain further, in object-relations theory, individuals and parts of them towards which feelings of love and hate are directed are considered objects. Frosh (2012) explains:

It sometimes refers to the things themselves – parents, or the mother’s breast, for instance – but its main meaning is that of the mental *representations* to which these things give rise, the ‘internal’, fantastized versions of people that populate the mind. This is why one can talk about a ‘gratifying object’ or a ‘punitive object’: the ‘real person’ concerned may or may not have these attributes, but in the mind they have become *personalized* in these ways. (p. 129, original emphasis).

Black *et al.* (2009) explain that the student, Nikki, in their study sees good mathematics as “true” and bad as that which is memorized and regurgitated. For Nikki, “[t]his is a splitting that draws on the gendered discursive position ...which constructs boys and men as being associated with the authentic creativity of the former and girls and women with the mindless rule following the latter” (p. 23). In another study, Mendick (2006) seeks to trouble binaries of ability/inability and able/unable that define the split subject through a psychoanalytic thought experiment. She argues that the concept of ability has a cost, and that “inability becomes evidence of not being able to bear to know something, of a desire not to know” (p. 133; also see Bion, 1967). She goes on to remind us that inability as such, as a “refusal of knowledge” is “indicative of the incapacity – or the unwillingness – to acknowledge one’s own implication in the material” (Luhmann, 1998, p. 149 in Mendick). Mendick recounts Melanie Klein’s analysis of a 13-year-old child dealing with the concept of long division, fearful that the

number would not like being split up, chopped and bleeding as it were. The refusal to confront this literal interpretation of what it means to divide something, transplanted onto the visceral body, rendered the boy unable to complete long division.

The case of the young boy also highlights the concept of transference and countertransference in psychoanalysis. In 1905, Freud defined transference as:

...new editions or facsimiles of the impulses and phantasies which are aroused during the progress of the analysis; but they have this peculiarity, which is characteristic of their species, that they replace some earlier person by the person of the physician. (p. 116)

The idea that there is a new edition indicates that there is a translation of an original story in the patient's past, and that feelings are transferred onto the analyst in the clinical relationship. The interpretations of these phantasies by the analyst is a way of understanding the past. For Klein, the transference dynamic is not organized around displacement but rather *projection*, in which parts of the analysand's personality are "externalized into the mind of the analyst" (p. 194). In other words, the patient's present emotions are conflated with the clinical relationship, and this brings the therapeutic space into the present (rather than a disjunction between the past and present). People have integrated emotions that are alive in the current moment and not merely reaching into the past. Countertransference is a response to the patient's transference by the analyst. Acknowledging the impossibility of impartiality, countertransference puts a name to the

key source of knowledge... about what is coming ‘from’ the patient in the form of projections... The idea here is that the analyst has an unconscious reaction to the specific qualities of the patient, and that the analyst needs to cultivate the capacity to register, recognize and understand this reaction and use it as a *guide* to the patient’s transference. (Frosh, p. 200)

Returning to the story of the young boy who has a fear of splitting numbers as they might not like to be injured, the projection of the student’s fear of injury (perhaps from a past experience or traumatic history) is transplanted onto numbers (the object) and articulated to the therapist in the form of a threat to the relationship. I think of this in the mathematics classroom in which my manipulation of numbers so freely might cause a sense of angst, of visceral harm to my students. The projection by the young boy in Klein’s story is held onto by her who feels the sense of pain and internalizes that there is something wrong with the patient, and the aspect of countertransference is this lodging of unconscious conflict in the analyst who then feels and thinks about how to deal with it, and returns with a response to the analysand.

Thinking through other forms of projection (also called projective identification), we might consider a desire not to know in mathematics as arising from a fear of new knowledge as endangering personal security by revealing ignorance (Canham, 2006). This fear differs from the somewhat horrific metaphor of the student in Mendick’s study, instead describing gendered representations that threaten students’ core identities. Shaw (2009) explains, drawing upon Bion’s “yearning for the legitimacy of mathematics” (p. 89), how the search for the precision of mathematics is a “yearning for the security of identification with masculinity” (p. 89). In this vein, there is a large amount of research

that seeks to understand students' perceptions of their gendered-subjectivities in relation to mathematics as a "hard" subject that "shares some of the same characteristics for which men are valued – that is, of being potent, precise, authoritative, determined, demanding, and willing to take the grand view" (Shaw, 2009, p. 90). This yearning for security has also been read through Klein's binary of the paranoid-schizoid position and the depressive one, an oscillation between love and hate attached to the same object (and the phantasmal construction of objects in the mind), and the guilt associated with realizing that good and bad can exist together at once and that one's fury and reaction to objects are previously unfounded. The emergence of the depressive position might be likened to an emergence of subjectivity (an ability to think through extreme emotions).

The Divided Subject in Education

In the introduction to *Lost Subjects, Contested Objects*, Britzman (1998) asserts that "[l]ost in the fault lines of debates on knowledge is the question of education as psychic event" (p. 3). She goes on to ask, "[s]hall we admit that something other than consciousness interferes with education?" (p. 4). Struck by both of these statements, I contemplate how education might be considered a "psychic event." Education's spaces are inherently social (classrooms, schools, academies, research laboratories) yet deeply entwined with and dependent upon individual subjectivities and resulting identities whose multiple affects resound in classrooms as demands, resistances, opinions, meltdowns, and celebrations by students and teachers. Education as a field of study and institution has historically been concerned with a progressive view of the subject, one whose development can be measured through tests, progress reports, and transcripts

(Appel, 1996, Taubman, 2009). No doubt, education's fraught relationship with psychoanalysis rests in the latter's focus on that which is immeasurable and uncertain within the subject – “the love and the hate, the desire and the fear” of learning (Bibby, 2011, p. 2). For education, this amounts to confronting the possibility that despite the best intentions of teachers and students, what happens in the classroom is well beyond our control. Ironically, this tension – indeed this Freudian definition of ambivalence (the coexistence of love and hate) – characterizes both the psychic event specifically, and the larger field of psychoanalysis in relation to education. Sigmund Freud defines a psychic event as the simultaneous connection between an external event and an internal reaction, one that is both unexpected and an extension and elaboration of the psyche (Malabou, 2012).

If, as Britzman (1998) contends, education is a psychic event, one might first consider psychoanalysis as exogenous to education – troubling, uninvited, and whose knowledge is “disavowed” (Taubman, 2012). Its provocations incite the seemingly heretical notion that inside education coexist feelings of terror, trauma, anxiety, and adoration about learning (Gaitanidis, 2012; Wexler, 1992). The working-through that is psychoanalysis's primary method asks about how the unconscious interferes with the everyday experiences of individuals. Some education scholars have thus begun to ask about our unconscious workings in teaching and learning – what Britzman, citing Anna Freud, calls “new editions of very old conflicts” (1998, p. 2) that are uncomfortable, jarring, and seemingly unreachable except through manifestations such as dreams and phantasies which become sites of psychoanalytic interpretation (Bibby, 2011; Britzman, 1998, 2003, 2006; Brown, 2008; Gallop, 1997; Taubman, 2012; Walkerdine, 1990). By

reading transference and countertransference dynamics in the stories participants tell, I can gain insight into what histories individuals bring into the classroom and how individuals' projections (students onto the teacher and vice versa) might be understood as psychic conflicts.

We can return to Althusser (1971) who draws upon Lacanian and Freudian theories to contend that if subjects were aware of the ways ideological apparatuses subject them, they would not be able to function. Althusser suggests that ideology works on the unconscious and forms the subject through discourses. This means that while individuals might be able to *recognize* ideologies and their practices, they do not have *knowledge* of them.

Althusser's claim becomes a point of important tensionality for psychoanalysis as an epistemology for education. On the one hand, the field of psychoanalysis is comfortable with dividing the subject from the social and privileging the interiority of subjectivity: it's all in the mind and the unconscious is riven with conflict. On the other hand, the subject emerges into the social through/on account of power structures and institutions such as schooling. I must ask, then, how might we avoid reducing subjectivity to social determinism? Judith Butler (2004) reminds us that "[t]he 'I' who cannot come into being without a 'you' is also fundamentally dependent upon a set of norms of recognition that originated neither with the 'I' or nor with the 'you'... [We must] think through [humans'] primary impressionability and vulnerability with a theory of power and recognition" (p. 45). Central to psychoanalytic theories is that the encounter with "otherness" splits the subject, and that this encounter is inherently negative and antagonistic.

In education, the Other might be the material objects of education (texts, knowledge, theories, curricula) or the individuals participating in the scene (students, teachers, colleagues, peers). The defence against the Other is the crux of what differentiates *subjectivation* and *subjection* – the former, a process by which one becomes a subject, and the latter a state of being oppressed or dominated (Butler, 1990; Youdell, 2006). So, what forms of agency reside in the subject/Object relation in education? A Lacanian analysis suggests that focusing on certain textual objects in education results in particular desired readings (by the teacher or curriculum) that are asocial by neglecting the ways the subject interacts with texts (Holland, 1980). Hall (1980) articulates this problem as “the capacity of the text to set the viewer ‘in place’ in a position of unproblematic identification/knowledge” (p. 159). Speaking about literature, Shoshana Felman (1982) notes that

[I]like the psychoanalyst viewed by the patient, the text is viewed by us as a ‘subject’ presumed to know – as the very place where meaning and *knowledge of meaning*, reside. With respect to the text, the literary critic occupies thus at once the place of the psychoanalyst (in the relation of interpretation) *and* the place of the patient (in the relation of transference). Therefore, submitting psychoanalysis to the *literary* perspective would necessarily have a subversive effect in the clear-cut polarity through which psychoanalysis handles literature as its other, as the mere object of interpretation. (pp. 7-8, original emphasis).

Felman’s challenge to literary criticism can be transposed onto the field of education, a location where knowledge also resides. The education researcher (including myself) exists in limbo like the literary critic: as a reader of the texts of

education, as practitioner, and as researcher, I occupy multiple positions in crisscrossing chains of signification. This Lacanian reading partially challenges the agency of the subject. Though the subject is not open to be interpellated by all types of discourse, subjects carry with them the residues of previous interpellations which shape how subsequent interpellations will occur (Appel, 1996, see p. 136). This reading also has ramifications for how we view subjectivity of all players in education's drama, and how we conceptualize the precise *moment* of interpellation.

The things texts signify change on account of their multiple readings; similarly, education changes on account of being analysed recurrently as psychic event and social institution. The field of education, like the subject positions of those in it, is an unstable object of analysis. Heeding Althusser's (1971) reminder above, perhaps educational researchers' *recognition* of psychoanalytic discourses (bearing in mind the concepts of "ideology" and "discourse" operate as comfortable totalizing concepts which appeal to the Symbolic), allows them only the agency to recognize that they are both subjects of ideology and situated within its permitted psychological limits, if they can tolerate knowing about these constraints at all.⁵

⁵ We can also return to Freud (1908/1959) who asserts that the sexually repressive nature of society causes neurosis and vice versa; neurotic conflicts define society. In his theory of sexuality, conflicts within the primal community arise because the father has unbounded sexual freedom and aggression. The sons' rage leads them to murder the father. The resulting guilt creates a more egalitarian but repressed society in which nobody can act with the primal freedom and instinct of the original father. Bettelheim (1979) claims that education is dependent upon fear that arises from this kind of guilt in the superego; anxiety creates uncertainty and students become creative under certain kinds of neurotic pressure. A post-structuralist educational perspective might draw on Foucault (1980) here to remind us that all knowledge is saturated with power and that discourses are a series of signifying practices. I might therefore contend that one of the things psychoanalysis offers as an epistemology (whose practice already involves reading affects of subjects through their manifestations) in educational research, is the analysis of the "symptoms" of some of these educational performances: journals, artworks, revelations, emotions, breakdowns in the classroom and elsewhere. Whether possible or not, psychoanalysis at least aims to read beyond the

Looking inward at the educational scene of learning and teaching, we can return to another Lacanian concept. The subject/Other relationship is defined by *lack* – “a deficit between need and its articulation as demand – that brings desire into being” (Appel, 1996, p. 125). As stated previously, the subject is continually renewed and changed through its encounter with the Other, a constant striving to return to a state of unity, to alleviate the lack (Bowie, 1979, 1991). In mathematics this often takes the form of certitude in correct answers and the reliability of operations and formulas. All is not well, however, if the subject cannot control the symbols or his or her symbolization. Panic and anxiety might ensue. Britzman (1998) draws upon Michael Balint’s (1957) concept to describe this “mixture of extremes” (p. 4) as a concept which applies not only to the subject’s interiority (swings of emotion, bliss, and dependence) but also to characterize “the extremes of learning, of history, of the social bonds, and of love” (ibid.). The psychoanalytic process of working-through extremes, confronting the lack that desire creates, characterizes learning. But we must also be mindful of Žižek’s (1991) warning that *jouissance* is only possible on the basis of some level of ignorance: “[i]n psychoanalysis, knowledge is marked with a lethal dimension: the subject must pay the approach to it with his own being... access to knowledge is then paid with the loss of enjoyment” (p. 68).

Education has also been described psychoanalytically in Anna Freud’s terms – as “all kinds of interference” (Britzman, 1998, p. 1). Britzman explains in *Practice Makes Practice* (2003) that “essentially individuals must interfere with one another because

totalizing narrative of educational discourses as whole bodies of knowledge to understand the abnormal, incomplete, and often incoherent narrative that is educational experience.

having to learn and having to teach is felt as interference...Paradoxically...education is made from this conflict” (p. 8). To this end, she enters the terrain of cultural studies theorists Giroux and McLaren (1992) who remind us that identities are construed by “a range of subject positions around which subjectivities tend to cluster and/or resist each other” (p. 15). Describing the act of teaching, Anna Freud (1979) defines the process as “learning twice” – first by oneself and then by working with others. Felman (1987) similarly advocates for a process of “self subversive self-reflection” in which one learns from texts and materials and then re-creates meaning on account of the learning. This is an affront to the common conception of learning to teach as a well-timed rehearsal of ready-made materials. Instead it demands that teachers inspect how they interact with students, creating new ways and contexts for learning, and understanding the transference that occurs (Freud, 1912). Britzman and Pitt (1996) explain, “transference shapes how teachers respond and listen to students, and how students respond and listen to teachers” (p. 117).

I might suggest that educational methodologies that imply mutuality, including those that recognize transference, help to challenge the hierarchy implicit in education’s teacher-student relationship. Jessica Benjamin (1988, 1990), conducting work with mothers and infants, contests the generally held Freudian belief that development is a process of antagonistic separation from the other. She instead argues that it is possible to have ties to another human being without what she later terms a doer-done (2004) relationship. What Benjamin’s intersubjective work implies is that one’s ties to another are neither about identification nor subjection because the other does not have to be seen as oppressive or threatening. Mutuality would, in effect, suspend the subject/object relation whereby neither subject is an object, and neither is Other. While this is an ideal

(society's hierarchies of sexism, classism, heteronormativity invariably position some subjects over others), the concept is to recognize each other equally – at least on the level of the conscious. In some ways, this reminds me of Martin Buber's (1947/2002) "I-thou" relationship.⁶ The subject is validated not *against* but *within* the space of learning on account of a revision of education's psychoanalytic epistemologies – ones that take the affective knowledges produced in the learning space as valuable.

Cultural Studies and Mathematical Discourses

Post-Structuralism and its Challenges

Poststructuralist approaches to discourse are predominant in identity work in mathematics education (Appelbaum, 1995; Chappell, Ernest, Ludhra, & Mendick, 2014; Hardy, 2009; Llewellyn, 2012, 2014; Moreau, Mendick, & Epstein, 2010; Moreau, Mendick, & Epstein, 2009, Walshaw, 2001). Post-structuralist approaches deal with the concept of power in policy statements about what students ought to know about mathematics, what it means to have power of numerical reasoning in the classroom and everyday life, how discourses of mathematical knowledge create communities where belonging confers power onto individual members, and how numbers themselves have "mathematical power" as a language. Research in mathematics education largely adopts a Foucauldian lens whereby the process of engagement in discursive practices forms

⁶ Without going in circles, I am aware that the concept of mutuality leads us back to repression. The interiority of subjectivity again takes centre stage as one might have to repress the emotional responses to norms conditioned through language at the inception of one's consciousness. The trauma of repressing socialization's violent processes brings us back to the reminder that the subject is split – repressing instincts that do not fit with society's norms, and potentially projecting trauma in the form of aggression onto others.

speaking subjects and their worlds (Foucault, 1972). Mathematics identities might be said to operate within acceptable “regimes of truth” (ibid.) – strict pedagogical conditions that define what is considered “knowing mathematics” well.

There are challenges to aspects of post-structuralist views of mathematics identities – what Wetherell (2012, p. 122) calls “jukebox” theories of identity that are unclear about why certain subject positions are hailed into particular discourses and not others. In mathematics education research, discourse both includes semiotic representations and the ways people are constructed in and through existing discourses. Chappell, Ernest, Ludhra & Mendick (2014) explain that the latter includes

the illocutionary force of language that enacts power, makes positions available/unavailable, and socially and psychologically positions speakers and listeners... Some knowledge emerges as legitimised and authoritative; other knowledge is resisted or repressed. (p. 3)

Hossain, Mendick & Adler (2013), invoking Foucault’s (1980) perspective that human subjects are effects of discourse, describe a process of “identity work” whereby the mathematics pre-service teacher is both constrained within available discourses but has agency and power to negotiate his or her own discursive positioning. Discourses are therefore not wholly deterministic in that they provide possibilities for subjects to negotiate different kinds of being, in fact, “offering us possibilities for being at all” (p. 37). Llewellyn (2014), also grounding her work in Foucault, contends that some discourses are received more strongly than others. Questioning whether “teaching for understanding” should be the natural goal of mathematics pedagogy, she asks about the

way we see children – through romantic discourses of understanding mathematics whereby the “the correct version of the child is autonomous and naturally curious” (p. 127). In turn, Llewellyn examines how discourses of understanding can be a fantasy (and perhaps fiction) of learning, and how they shape teachers’ views of children as natural and rational. In Western society, discourses about mathematics represent mathematicians as rational and male (Harding, 1998; Wertheim, 1996), a condition which has had real impacts on mathematics learning by positioning particularly white, male mathematics students as able to enter discourses readily available to them as natural (Gates, 2001; Picker & Berry, 2000, Solomon, Lawson & Croft, 2011). This longstanding view has permeated popular culture narratives in television and movies which have consistently sidelined women as being mathematically stunted (Moreau, Mendick & Epstein, 2010) while positioning white males, or model Asian minorities as having the “right” kind of understanding (Alker & Davidson, 2012).

Brown and McNamara (2011), in *Becoming a Mathematics Teacher*, push this view further but with a twist. Using Derrida, they draw a parallel between living with media and engaging in learning. If media conditions the way people understand their lives, then people have trouble distinguishing between what is real and what is fictional, given that much of our life exists virtually on social media. Brown and McNamara contend, “human subjects are similarly produced through these fictional devices, schemes, discursive styles, curriculum frameworks or models of practices... The individual cannot hope to comprehend or predict the multitude of filters through which he or she could be understood” (p. 18, emphasis added). As such, one of the challenges of the mathematics learning environment is being able to set oneself apart from the

language and social structures surrounding mathematics learning, to be heard and understood in alternative ways outside the limiting worlds of mathematical discourse.

Socio-cultural readings of mathematical discourses

Undoubtedly, the larger cultural studies concerns such as class, gender, and ethnicity are important to understanding identities in different mathematics learning environments (Beach, 1995; Boaler, 2002; Hodgen, 2011; Lerman, 2006; Ma, 2010; Ponte & Chapman, 2008; Sfard, 2008). Ogbu (1992) reminds us that students bring to school “their communities’ cultural models of understanding ‘social realities’ and the educational strategies that they, their families, and their communities use or do not use” and that these shape the kinds of discourses students present in the classroom (p. 5). Hodgen and Marks (2009) claim that learning is identity development located in communities of practice (Wenger, 1998). Learning is a negotiation between the individual and the social schema that enculturates particular mathematical identities (they pre-exist the learner entering the space). Boaler and Greeno’s (2000) study revealed the stories of girls who feel disempowered and alienated in mathematics because they had to adopt identities available to them, including feeling prevented from questioning ideas and concepts. Davis and Williams (2009) describe how hybridity of mathematics talk and peer talk in high school classrooms (ages 16-19) creates a community of “hybrid discourse” that creates new classroom spaces and results in a “blurring” of the ways traditional pedagogic codes are classified (p. 136-7). Students, by inserting their own “street talk” into mathematical discourse, actually shape a new social and cultural context in which mathematics is better learned. In all of these studies, it seems that students’ identities are complicated by their difficulty moving

between different social and economic classes to which they have been assigned (also see Gates and Noyes, 2014).

Operations and calculations as Discourse

Another cultural studies object for mathematics education has been the language/text of mathematics itself. Recalling Lacan (1979), the unconscious emerges out of the subject's encounter with language, and that it is "structured like a language" (p. 149). Some studies ask how specifically mathematical language enables subjects to come into being. Anna Sfard (2009) describes "the secret charm of numberese" in discursive terms – as a privileged language only accessible to the few, whereby "numerically grounded statements are not anything one can argue with" (p. 11). Skovsmose (2000) similarly argues that some discourses create learners who know that mathematics is not their business – whose "inverse competence" helps to shape society by providing a sector of the population who simply cannot challenge society's technological (often destructive) advancements. Reading the status of some who are inevitably ignorant, who are (biologically or deterministically) unknowing and unable to enter the world of mathematical language, creates certain mathematical subjectivities formed not by the entry into language which Lacan describes, but by the failure of that entry – a real societal concern, or at the very least a popular psychosis (think of the t-shirts for little girls at Wal-Mart with slogans declaring "Math is Hard!") Some might argue that those who cannot compute fail to emerge fully into the world at the level of the unconscious. Consider the argument by Brown, Hardy and Wilson (1993):

Mathematics is an interplay of mental signs where closure is only ever for the time being, and never quite perfect... Numeracy, as a state, forces the reduction of mathematical activity into communicable or accountable commodities. This commodification simultaneously creates and denies visions of a world where everyone is numerate... a false totalization. ...To talk mathematics, I need to use the language of the tribe if I am to communicate, in a quest for be accepted by the Father [nom du père]. (p. 13)

In ways similar to literature (Felman, 1982), mathematics can also be the “place where meaning and knowledge of meaning reside” (p. 8). Boylan and Povey (2009) explain this through the story of a student named Louise, for whom mathematical objects “act” in ways similar to how people experience each other. Numbers “are sometimes uncooperative, uncontrollable, and untrustworthy others who deceive and trick” and Louise feels “subject to them and their capriciousness” (p. 57, original emphasis). Thus the dialectic of mathematical identities located within the subject and against Others (mathematics teachers or mathematics language and concepts themselves) implies that all individuals encounter mathematics at some level of “truth.” According to Brown (2010), while objectivity is a culturally situated concept (mathematics exists as a sometimes impenetrable and privileged system still shaped by cultural norms and knowledge), truth can only be experienced but not fully represented. To that end, subjects feel mathematics but do not fully come to terms with the unconscious pull that situates mathematics as beyond language or culture. I am not sure that situating mathematics extra-discursively is productive. We cannot escape the discursive landscape that shapes our consciousness, even as it wants to come to terms with some kind of felt

mathematics “experience.” The subjectivities at play – individuals who might love, hate, fear, or champion mathematics – are nevertheless shaped by cultural, familial, and historical associations of mathematics that make them mathematical learners of various kinds.

Returning to the Research Questions

Having traversed these three areas of the literature to underpin the rest of this study, I take note of the ways that the existing literature both addresses aspects of my research questions and helps to frame the ways I understand the interview transcripts of my participants. To start with, as curriculum studies though diverse in approach as a field, is consolidated around taking up the importance of individual identities as the site of educational inquiry. As this study is also interested in the kinds of identities that emerge within the mathematics classroom, *currere* with its psychoanalytic underpinning, offers a way to begin framing the kinds of relationships that are formed with mathematics as a text (calculations and operations) and as a pedagogy (the transferential and countertransferential dynamic with the teacher). Just as much of the mathematics education literature about identities relies on the power of stories to landscape the experience of teaching and/or learning mathematics, this research draws on curriculum studies to enrich the technique – that is to have participants reactivate their past, present, and futures. The public and private narratives about mathematics learning and teaching that are interconnected help address how mathematics shapes individual identities beyond the Grade 10 classroom. Rather, as I explore the psychic conflicts – via the defences that Nimier (1993) describes in learning mathematics – the participants in this

study might have something to say about how mathematics stays “Other” to their subjectivities (as a language) or, conversely, how mathematical symbols lend order their worlds by alleviating the Lacanian lack. In the analysis section of this dissertation, I get underneath what psychic conflicts emerge from the learning and teaching space of the classroom. What “extreme states of certitude” offered by mathematics equations and their right answers (Bibby, 2000), reinforced by popular culture tropes, lead individuals to seek available discourses about what it means to be good at mathematics? And how are the dynamics of transference and countertransference part of the defences against these discourses? In the next section, the theoretical framework will outline how a methodology will unfold to begin answering the research questions and lend insight into how *currere* helps to uncover specific psychic dynamics that shape mathematical subjectivities.

Chapter 3: Theoretical Framework

One of the oldest ideas... is the Socratic imperative "Know thyself." It is difficult to argue against this advice, for surely we in education understand that our naked subjectivity is the only means we have to relate to others. Additionally, in thinking about the qualities of relations we make – what is to influence and to be influenced, what it means to care about something and recognize what the other cares about, and how our preconceptions of events may work as defenses against being affected – in all of these immaterial events, each individual learns of her or his knowing self.

(Britzman, "Foreward" in Alsup, 2006, p. xii)

In the above quotation, Britzman asks us to consider how our "naked" subjectivities are the only ways we have, as teachers and students, to relate to one another. The purpose of this theoretical framework is therefore to incorporate key concepts outlined in the literature review in such a way as to conceive of possibilities for understanding each other with, against, and through mathematics using the vocabulary afforded us via psychoanalysis. Britzman's argument that education is a "psychic event" underpins the psychoanalytic inquiry of student and teacher experience that follows. Furthermore, the reliance upon narrative as a mode of understanding subjectivity will be discussed as the participant/researcher responses might be considered "narrative modes of subjectivity, discursive means of self-disclosure and self-understanding" (Garrison, 1997, p. 191). To underscore this, I return to the story of Courtney that opened my dissertation, and offer a rhetorical analysis using the psychoanalytic concepts of transference and countertransference⁷ in order to frame the kind of lens I will use for the analysis chapters that follow.

⁷ To reference these definitions once again, transference is when a person "regularly directs feelings towards the persons (or texts) he or she meets, in which the feelings represent unconscious impulses or needs that are not remembered" (Robertson, 2004, p. 91). Countertransference is when these modes of transference affect others (like students in teachers' classrooms) and cyclically, influence the person's transference.

The second part of the framework outlines a series of defences in relation to mathematics specifically. While the word “defences” evokes a negative connotation, this is not necessarily the case. As Rycroft (1995) explains:

The concept of defence is usually stated in terms which imply that the human ego is beset with threats to its survival emanating from the [Freudian] id, the super-ego, and the outside world, and that it is, therefore, perpetually on the defensive. But the concept is better regarded **less negatively** and taken to include all the techniques used by the ego to master, control, canalize... Since psychoanalysis holds that anxiety is a spur to development, some, perhaps all, of the defences play a part in normal development... (p. 32; emphasis mine)

In this study, I employ Nimier’s (1993) typology of three manic and three phobic defences as a way to begin reading participant/teacher narratives as manifestations of unconscious desires in relation to mathematics. The defences also provide a structure for decoding participant responses to mathematical discourses such as those in *The Big Bang Theory*. Television, as an externalizing influence on the unconscious, works back to influence individuals’ conflicts about learning and teaching mathematics.

Next, I suggest that a theory is needed that asks “what is after interpretation?” In other words, with the typology in hand that underpins the rhetorical analysis of participant responses, how might I understand the workings of the unconscious mind in relation to teaching and learning mathematics? I will argue that 1) an interpretive methodology is needed to understand the dynamics that attends to how we (both teacher and former students) might read the scene of mathematics learning, and 2) interpreting

defences provides a window into what *implicit relational knowing* is already taking place or might be absent in mathematics classrooms like mine. Drawing upon questions posed by Stern et al. (1998) about what might exist “beyond interpretation” (of dreams or stories) in the therapeutic setting, I contend that the ongoing knowledge about mathematics can be gleaned from students in the classroom, as documented in my teacher journal and gathered from interviews in this study. The stories of loving and hating mathematics lead me to suggest that the “interactive intersubjective environment” in the classroom might be understood as spaces where individuals move toward mutual goals (p. 907). This goal-driven space of learning is not symmetrical, nor is it linear. Instead, they “demand a constant struggling, negotiating, missing and repairing, mid-course correcting, scaffolding, to remain within or return to a range of equilibrium” (p. 907). This “moving along” process helps to delineate, the behavioural parameters that influence recognition of the mutual partners in the educational – the students and teacher, the students and society at large (public discourses), and between students.

Finally, I would like to make the case for why this research is so vital to education. Situating my work in curriculum studies, this monograph will be organized through the concept of *currere* (Pinar, 1975a/b). This performs the pedagogy of *currere* by way of modelling how one might gain personal and analytical insight into the mathematical educational space. By rereading past events and destabilizing the temporality of educational experiences (that is, to offer a way of understanding narrative in a non-linear way by reading backwards and forwards), we can begin to understand the inner life of teaching and learning mathematics.

Transference and Countertransference: Courtney, the math kids, and me

To begin mapping this theoretical framework, I return to the journal entry that opened this dissertation. I offer here a short analysis of those emotional words in the prologue to highlight some of the questions of subjectivity grounded in reading the unconscious that drive this dissertation work forward. To do so, I now read the vignette rhetorically through the psychoanalytic concepts of transference and countertransference. As outlined previously, rhetorical analysis involves understanding *how* authors use words to create a certain effect, rather than *what* is being argued. A valuable tool in looking at personal writing, I am able to look back at my journal entries, searching for patterns and repetitions of language. This method is an analytic “way in” that looks beyond the literal and into the world of the unconscious. If Courtney’s tears and my hatred of forcing the curriculum onto my students come from deep inside our very beings, how can I attend to questions of where these feelings emerge?

First, let us remind ourselves that transference is:

the displacement of patterns of feelings, thoughts, and behavior, originally experienced in relation to significant figures during childhood, onto a person involved in a current interpersonal relationship. Since the process involved is largely unconscious, the patient does not perceive the various sources of transference attitudes, fantasies, and feelings. (Moore & Fine, 1990, p. 196)

Lacan (1979) explains further: “As soon as the subject who is supposed to know [*le sujet supposé savoir*] exists somewhere...there is transference....The question is, first, for each subject, where he takes his bearings from when applying to the subject who is supposed to know” (p. 232). In the classroom, the teacher might be thought to be the subject who knows, or is supposed to know. In my journal entry, written from the literal and metaphorical couch, I need to consider how I might be “a subject who is supposed to know” mathematics – someone who has “always ‘gotten’ mathematics,” even as a child, and who feels “horror” that one of my students “can’t even divide!” In the moment where this event happened in my classroom, I felt hatred and apathy towards Courtney, and I responded to her tears by ripping a piece of brown paper towel from the dispenser bolted to the wall and offering it to her. The silence in the room was jarring. Honestly, it seems quite horrible now, years later.

In the moment where I perceived a failure in Courtney’s learning, the countertransferential dynamic was writ large. Courtney’s history of feeling persecuted by the calculations of mathematics and those who conveyed them (seemingly unfeeling teachers like me) flowed in the form of tears, drowning the space in silence. My internal response of horror that she cried in the face of a simple calculation calls forth my own history of being attached to the performance of mathematics. I was always able, even eager, to give responses publically. I implicitly felt it was a normal part of mathematics learning to be able to provide quick and easy solutions. Bringing my own history of mathematics into the room meant there was a lack of learning between us. I could not fathom in the moment why anybody would cry, and in a moment of internalization of her projection of hatred of mathematics, the countertransference – that which responds

to the projection of hatred by Courtney – was hatred too. The coarse paper towel and silence tells a painful story, perhaps of my own history with mathematics. Cut from the cloth of high expectations that I was *able* to meet in the classroom, I was not able to understand how someone could not handle the most basic operatives of a space, the mathematics classroom, whose very foundation was the ability to carry out basic computations. My own ignorance *about* learners became the ignorance *of* the learners who then couldn't function mathematically.

Mathematics education scholar Tamara Bibby (2009) draws upon the lengthy canon of Britzman's work to describe how pedagogic practices influence learners' identities. She suggests that "we need to acknowledge the ways in which education is about the unknown and the inchoate: the way it is about what learners may or may not know and understand...Education [is seen as] wholly and commonsensically 'a good thing'...idealizations of education defend against the terror of the unknown..." (p. 124). I notice that numbers and mathematical processes hold a special place in the rest of my story as things which are simultaneously known and clear to me as a *student* of mathematics but are simultaneously frustrating as concepts to be *taught* – they evoke "hate" in me "*for* the kids" (emphasis added), as I perceive them to be looking at me with "terror and apathy." As a matter of countertransference back onto the kids, my own lifelong competence permeates the teaching space, and it is comforting to think of my relationship with "slope" as strained because it stands in for the miracle of students eventually being able to "rehearse what I have taught them." Crammed into the same classroom all year, students have "emotional attachments" to me but, importantly, seemingly not to the mathematical content. Even though I enter the teaching space

cognizant that those “applied” students must be “least like me,” I am frustrated by having to work through “rise over run [which] takes over my life.” I am troubled and yet adore (“really am proud”) that students rely on me as one who can get them through their exams, an emotionally gratifying justification for my own mathematical identity, conveniently reinforced by students’ messages to me each summer “joyful, exclaiming ‘look, Miss!’...passing grades.”

Reading Readings

The idea that the psychic life of students and teachers is important to examine in education is not new, as I have shown in the literature review in the previous chapter, and in this short reading of my journal entry. In fact, the work of Radford (2008) describes how beginning teachers read juvenile historical fiction, and how their recursive process of reading was “an articulation of energy, movement, and dynamic engagement” (p. 46). In this work, the reading of risky texts caused a “tearing through’ into memory that seem[ed] difficult to bear” for the participants whose practicum stories of working with the texts revealed their “preoccupation with adolescence, as a feature of memory offered up to research, and as projected fantasy site for their future work as teachers of adolescence” (p. 46). Similarly, in Lewkowich’s (2014) research, B.Ed candidates teaching young adult fiction “occupy a psychically awkward zone, a difficult mental space that is further complicated through the interaction of personal histories, past educational experiences and projected anxieties and desires” (abstract, n.p.). Furthermore, reading teacher candidates’ readings of literature revealed that “the readers very often transfer themselves – through language – from the present of reading, to their

past experiences, to the implications they imagine such readings may hold for their future pedagogical endeavors” (p. 133). In this work, the textual centre against which I read my journey as a teacher is not youth fiction, but rather mathematics. The typology and analytic method that follow provide the theoretical framework to understand how this dissertation is also about “reading readings” – that is, my readings of students intertwined with my past teaching and learning, and students’ readings of their journeys through mathematics classes and into society as well. The text with and against I read myself, and the students read their lives, the show *The Big Bang Theory*, enables us to work through our identity related concerns as mathematicians of various sorts.

A typology for reading the Subject in mathematics learning

Working with the idea of reading-readings, I introduce here the typology that will underpin the conceptual framework as I unpack responses to the learning and teaching of mathematics. This typology is from Nimier’s (1993) paper entitled “Defence mechanisms against mathematics” in which he outlines how “phantasy [is] taken as the mental expression of instincts, but also as a means of escape – an escape from confronting external reality or the frustrated reality within. In this case it becomes a defence...” (p. 30). I will delineate the model for this typology by integrating the points in the above section along with the typology of defences. First, Nimier’s (1993) six defences can be paraphrased as follows. The six defences are divided into two categories. The first three are defences against mathematics and the last three are defences by mathematics (cited from Evans, 2000, p. 118 with questionnaire examples):

1. *Phobic avoidance*, which may bring ‘a sense of peace’ (p. 33). Example: “At the start of a mathematical problem, I feel as if I’m in front of a black hole.”
2. *Repression*, or denial of reality; for example, claiming that mathematics is meaningless.
3. *Projection*, or the rejection of ‘unacceptable’ feelings, wishes and so on from the subject onto mathematics. Example: “Doing mathematics sometimes risks bringing destruction, you only have to think of the atom bomb.”
4. *Reparation* (against destruction and anxiety) where mathematics is felt as useful, constructive, an object of value. Example: Mathematics brings you the pleasure of creating something.
5. *Introjection*, of order and stability. Example: Mathematics is a way of getting a strong character.
6. *Reversal into the opposite*, seeking to neutralise a disagreeable feeling, for example whenever a solution to a mathematical problem is found. Example: When I work something out, I feel like a void is being filled.

These defences taken together with the following concepts derived from the literature and theoretical framing of this work, might help to understand how participant responses might be modes of reading the self and how they help to bring forth and make readable, what is unconscious through expressions such as the stories told by participants and the researcher in this study.

First, if as Althusser suggests, ideology works on subjects via discourses, that is to say the unconscious is conflicted on account of societal power structures, the above typology provides a mechanism by which to understand participant responses to a) their

learning of mathematics CST in the classroom which is the rehearsal of the curriculum provided by the Quebec government, b) their responses to popular culture discourses that shape their subjectivities before they enter the learning space.

Second, the encounter with the other that splits the subject might be understood more fully. The “other” in this typology can be thought of as the texts and language of mathematics as well as the teacher who is the subject presumed to know. In other words,

[e]ither the anxiety and its supporting fantasies are displaced onto mathematics, and defences are directed against mathematics, so indirectly containing the anxiety; or the anxiety is contained in some other way, and defences can be seen to be mounted against this anxiety, mathematics serving as an instrument of this defence. Mathematics, then, through the fantasies that it calls forth, can be either that which you defend yourself against, or – on the other hand – that which participates in a defence against anxiety. It can even sometimes by splitting, serve as both. (p. 30; cited in Evans, 2000)

Third, reading the concept of *le sujet supposé savoir*,” the experience of mathematics can be read through this idea of splitting. For some, reading the text that is mathematics provides a way of defending against other things *using* mathematics (as in mathematics potentially providing a space of comfort or reliability) or defending *against* mathematics (the mathematics as the subject presumed to know). In both cases, the participants become subjects who are “set in place” as both analysts (of mathematics and their lived histories in the space) and as analysand (as mathematics and the learning is a matter of transference back onto the subject – that which “reads” the subject).

Fourth, the Lacanian concept of desire structured by lack is structured by narrativization in this study. In some instances, the lack might be understood by asking, “What void is mathematics filling in the telling of stories of adoration of mathematics?” Or, where repression or other phobic defences surface, “what does the narrativization provide to defend against mathematics?”

Finally, drawing upon the concepts Benjamin (2004) introduces, reading participant and researcher responses to the mathematics experience and *The Big Bang Theory* emphasizes the concept of mutuality in the dyadic teacher-learner relationship, and between learners. The mathematics might not be “done” to participants, nor might they be considered as “doing it” exclusively. Rather, the dynamic works both ways.

“Something more than interpretation”: Implicit relational knowing

Putting the above elements into action, I draw upon the work of Stern et al. (1998) to deal with the fact that it is not enough to end at merely coding participant and researcher narratives about their experiences in the classroom and views of the *Big Bang Theory*. Reading participants’ readings (including my own) involves understanding the intersubjective space of the classroom environment in which mathematics learning primarily occurs. Considering how mathematics is a provocation within the space enables me to explore the participants’ responses to questions about their past mathematical lives, experiences in the Mathematics CST classroom, and hopes for the future. As the central pedagogic figure in my participants’ lives, I also wish to understand what knowledge might have been made in the classroom space and what

might have been missing, thus leading to participants' particular readings of their mathematical identities.

In clinical psychoanalytic therapy, there are two kinds of memory and representations of events in terms of knowledge-making: explicit (declarative) and implicit (procedural) knowledge. The former is knowledge that individuals state and have brought into the conscious. The latter “operates outside conscious verbal experience” (p. 905). Rather than rely on this procedural knowledge between the individual and the world in straightforward tasks (i.e. how to swim), Stern et al. argue that *implicit relational knowing* provides the basis for later symbolic representations and includes “interactional, intersubjective processes” (p. 905) between people. Ogden (1994) explains this by reminding us that we must work hard to dismantle the concept of the subject as a dichotomous entity. In other words, “one can no longer simply speak of the analyst and analysand as separate subjects who take one another as objects” (p. 3). Rather, to “ask is not to tease apart the elements constituting the relationship in an effort to determine which qualities belong to each individual participating in it” (p. 4). The analytic project is thus to describe the interplay between subjectivities as they read their mathematical worlds. As such, in this theoretical framework, I assert that not only can people's past experiences be *read* psychoanalytically, but that the experience of learning mathematics in the classroom is akin to a therapeutic space that works back on itself and must be understood alongside these readings. Stern et al. (1998) explain:

Just as in interpretation is the therapeutic event that rearranges the patient's unconscious declarative knowledge, we propose that what we call a ‘moment of meeting’ is the event that rearranges *implicit relational knowing* for patient and

analyst alike. In this sense the ‘moment’ takes on cardinal importance as the basic unit of subjective change in the domain of *implicit relational knowing*. When a change occurs in the intersubjective environment, a ‘moment of meeting’ would have precipitated it. The change will be sensed and the newly altered environment then acts as a new effective context in which subsequent mental actions occur and are shaped and past events are organized. The relationship as implicitly known has been altered, thus changing mental actions and behaviors that assemble in the different context. (p. 906)

In the classroom, I argue that *implicit relational knowing* happens on account of the ongoing intersubjective relations between teacher/student and student/student and even between the participants and mathematics itself. What *implicit relational knowing* offers to this theoretical framework is the idea that the “sensing” of change at the unconscious level precipitates new actions or moments of declarative knowledge (as in when students say, “I hate this...when are we going to use it in our real lives!”). We can read this example as one of Nimier’s (1993) defences in the unconscious (repression) *while* recognizing that the declarative expression would have altered the intersubjective space of learning along the way.

Importantly, in this conceptualization of the intersubjective environment, there is mutual knowing of what the other person is thinking (conscious) as it pertains to the working relationship between them – whether that be teacher-student or student-student. Stern et al. (1998) explains that these “may include states of activation, affect, feeling, arousal, desire, belief, motive or content of thought, in any combination. These states can be transient or enduring, as mutual context” (p. 906). In reading the educational

space through psychoanalytic principles, and returning to Benjamin (1988, 1990), the mutual space between two people is based on the exchange of information between them and that the influence is bidirectional. In the original mother-infant relationship, this mutual regulation is organized around the psychological and physical states of comfort, excitation, hunger/feeding, etc. Thinking of the dyadic relationship in teaching, the development of a coherent relationship, just as in the mother-infant relationship, does not imply symmetry (i.e. the baby takes more than it gives just as a teacher might give more, or a student might give more). The “[f]ittedness gives shared direction and helps determine the nature and qualities of the properties [of the intersubjective relation] that emerge...Each of the actors brings his or her history to the interaction, thus shaping what adaptive manoeuvres are possible for each” (Stern et al., 1998, p. 907). The tolerance of the relationship between parties requires scaffolding and repeated returns to the dynamic of the relationship, as well as an acceptance of failures on the part of one or more parties. What is key is that the relationship is goal-oriented, and the process involves discovering these goals, agreeing upon them, and moving toward them in a temporal process of trial and error.

Unfolding this work as *currere*

No doubt, this dissertation is written with a beginning and an end. It is how books unfold, and this monograph is no exception. However, I wish to offer this dissertation as the curricular enactment of a *currere* process – itself a pedagogy to understand the learning experience of the participants in this study, including myself as researcher.

Grounded in Pinar's (1975a) work, *Curriculum theorizing: The reconceptualists*, the process of *currere*, derived from the Latin infinitive meaning "to run the course," this study will involve "investigation of the nature of the individual experience of the public: of artifacts, actors, operations, of the educational journey or pilgrimage" (Pinar, 1975a, p. 400). Similar to Dewey's (1916) analysis in *Democracy and Education*, wherein he states that education "is the reconstruction or reorganization of experience which adds to the meaning of experience, and which increases the ability to direct the course of subsequent experience" (p. 89-90 in Petrina, 2010), Pinar suggests that *currere* allows us to "bracket" the things that constitute educational experience in the world. Curriculum is, after, all, a lived experience told through autobiographical renditions of teachers' and students' stories, their subjective experiences of history and society – and the interrelationships between the interior worlds and the discourses which structure the experience of being educated.

In this dissertation, the process of *currere* is undertaken by "attend[ing] to the contents of consciousness as they appear" (Pinar, 1975a, p. 406). In order to unveil the concept of curriculum as a form of social psychoanalysis, I organize my dissertation through the four stages of the process. Cautioned by the words written by Pinar and Grumet (1976), I am wary of

not do[ing] what psychotherapists claim to be able to do in bringing ourselves to a 'primal scene' [rather, I] bring the structures of experience into our awareness, which, in turn enhances our ability to reposition ourselves as subjects who are capable of changing what we have experienced instead of remaining

unaware of our experiences and therefore remaining objectified by them. (pp. 57-58)

Documenting and understanding the intersubjective experience is one way to take up Pinar's call to get underneath horizontal thinking and examine the psychic workings of learning mathematics.

In doing so, I suggest that the organization of the data analysis chapters in this dissertation might best be served by naming the chapters using the four stages of *currere*: the regressive, progressive, analytic, and synthetic. The regressive demands analysis of the educational past of the learners and teachers; the progressive, a description of imagined futures; the analytic, the "psychoanalysis of one's phenomenologically derived educational past, present, and future" (Pinar, 1975a, p. 424); the synthetic, an attempt to move toward an integrated understanding of individual experience within a larger network of social, political and cultural experiences. This framework pushes me to understand the embodiment of the curricular experience non-linearly to include the possibility of multiple, simultaneous avenues of intersubjective engagement that make up the educational experience.

Chapter 4: Methodology and Research Design

***Currere* as Methodology**

In addition to conceptualizing this dissertation as a *currere* study, the theory of *currere* is also a methodology and it is important to understand why. In order to “get under one’s exteriorized horizontal thinking, to sink toward the transcendental plane, where the lower-level psychic workings...are visible”, the process of *currere* is first about focusing on that which is “observable, the external, the public” (Pinar, 1975). In working with my participants, I considered ways to involve them in the self-conscious conceptualization of the temporal that Pinar calls for in his four stages. How can we, together, disclose our relations to the self, through reading our relations to mathematics teaching and learning? How does one enter the space of the regressive, progressive, analytical, and synthetic stages of *currere* with a group of participants while enhancing our understanding of our experiences instead of remaining in a sense objectified by them? Moving between the space of the classroom and life lived outside of it, Pinar (2012) reminds us that the point of education is “understanding the relations among academic knowledge, the state of society, the processes of self-formation, and the character of the historical moment in which we live, in which others have lived, and in which our descendants will someday live” (p. 187). To that end, the process of interviewing participants needs to uncover how childhood learning experiences are brought forth in transferential ways in the high school classroom *and* how these early experiences and present ones are part of a larger historical picture. The standardization, racialization, gendering, anti-intellectualizing (among other things) of education have a part to play in how individuals see themselves as teachers and students.

To use *currere* as a methodology, I interviewed former participants of mathematics using questions with the four stages in mind. A series of questions were developed (outlined specifically in the Method of Data Collection to follow in this chapter) that attended to the overall aims of curriculum theorizing. The goal was to attend to the four stages so that participants were engaged in

...an ongoing reflection on his or her own past (regressive), ponder about what the future may hold in order to uncover hopes and aspirations (progressive), analyze what is uncovered in the regressive and progressive stages (analysis), and, finally, once the present has been thoroughly and deeply excavated and analyzed, make decisions about one's situation (synthesis)... (Sumara, 1996, p. 173)

The interview questions first asked former students to recall moments of their mathematical past and to dig deeply into their past histories of learning mathematics as children or in the CST 10 classroom. We then proceeded to talk about the participants' future career aspirations, what they were doing now, and what their goals were. A great deal of the interview time was dedicated to how former students felt about themselves as mathematical learners and what perceptions they had of teaching and learning in their past and the implications for their ongoing and future lives. Together, we analysed their responses through the television show *The Big Bang Theory* as a means to talk with and against the revelations they made earlier in the interviews. How might they read themselves against common stereotypes in the show? Finally, as the dissertation analysis proceeded, the synthesis emerged as a series of interpretations about former

students' place in society within and against public discourses about mathematical competence.

Given the use of the television show *The Big Bang Theory* as an artifact that helped unpack the progressive and regressive stages, I used the methodology of Screenplay Pedagogy (Robertson, 1995) outlined previously in my literature review alongside the autobiographical responses of the participants. Looking for repetitions of language and reading of defences (as per Nimier's (1993) typology) in response to *The Big Bang Theory* helped to unveil some of what is being transferred into the intersubjective space where learning occurs. As well, the external forces that enter the intersubjective space could be identified –in the form of already having seen the television show, or as other external factors that play a part in shaping the overall educational experience of learning CST Mathematics.

The experience of narrating one's self in relation to mathematics might be novel for the participants, calling forth unresolved desires, tensions, and affects in unexpected ways. As in the *currere* work of Radford and Aitken (2014), "the students are immersed in the backward and forward movement, "the working through of one's own unresolved conflicts" (Britzman & Pitt, 1996, p. 117), leading to the possibility that something of significance — both personal and social, with implications for self, other... may take shape" (p. 646). Part of what I sought to learn is how former students' past associations and future hopes or fears about what mathematics curricularizing means to them as learners and individuals caught in specific discursive regimes. Responses included the creation of certain stereotypes such as there being such a thing as "math people" that can be seen as either privileged (gifted, sought-after), or abject (socially incompetent, geeky)

(Francis, 2009; Mendick & Francis, 2012). My interpretive method recognizes that psychoanalysis offers a vocabulary of subjectivity, social interactions and communications that helps to uncover the workings of the unconscious in relation to mathematical learning experiences.

Through reading these former students' responses through the *carrere* stages rhetorically, I hope to recognize a "complex of factors" (Evans, 2000, p. 186) that are social, cultural (specific discourses of time and place) while "attend[ing] to the play of ...language as a thread of indicators...lead[ing] from a language of conceptual divisions and oppositions to a psychoanalytic language of desire" (p. 186) about mathematics. By then reading the ways students speak about mathematics popularization onscreen, I can understand mathematical identities and subjectivities, perhaps understanding better why mathematics seems to be located in society only within certain "permissible" subjects.

Participant Selection

Participants were recruited from a pool of former students known to me, with whom I still have contact with on social media. I set out to recruit a maximum of ten former students from the rural school that is part of Western Quebec School Board where I taught from 2010-2015 because of my familiarity with the school environment, community, and Board. The data collection was to take place over the summer study break from June to August 2016 which corresponded with my availability and those of students who might be enrolled in CEGEP, college, or university and otherwise might not be free to be interviewed. As well, because I was interested in participant experiences in the course that I primarily taught and from where my own teaching

journal emerged – the Cultural, Social Technical Grade 10 with government examination – former students must have taken this course, whether they passed or not. Participants were no longer in the researcher’s class or in the youth sector school system and were over the age of 18 as per the ethics approval from the University of Ottawa. Of the fifteen initial contacts I made via Facebook Messenger™, five former students agreed to participate in the study. All have been given pseudonyms in the analysis chapters that follow: Jane, Debra, Kate, Emily, and Mark. Since participants needed to have recent memory of taking the course, all participants were enrolled in Grade 10 mathematics in the last two years. The Recruitment Script can be found in Appendix A and the Informed Consent form in Appendix B.

Method of Data Collection

Since I knew the participants as past students, the interview technique consisted of a conversationalist tone. We often started by catching up with one another where I asked how they were doing now and how their lives were. Given that I spent at least one school year teaching the participants in the past, the style of interviewing was one already situated in a great deal of familiarity as participants were able to talk freely, and we were able to dive into the questions without hesitation. This was beneficial as less time was spent in formal introductions and participants were used to asking me questions and/or responding to mine in a previous context.

To begin the interviews and start with questions that attended to the first two stages of *carrere* – the regressive (past experiences) and progressive (future aspirations

including career goals) – the participants were first asked four initial questions in a recorded ten minute initial Skype interview, after basic personal information was ascertained (age, gender, current schooling/employment status). Questions included: 1) How might you describe your past experiences of learning mathematics? 2) How do you feel about the subject and has this feeling changed over time? 3) In what contexts do you think about mathematics outside of school? 4) What kind of representations of mathematics and/ or mathematicians come to mind in everyday society either in your past or now?

After this initial interview, in preparation for the analytical stage where participants began to synthesize their experiences of the past and future in the present context, I sent a link to three clips from the television show *The Big Bang Theory*. The sum total viewing time for all clips combined was 12min 46 sec. The three clips are as follows:

Selection 1

The first clip is a 59 second selection from Episode 73, entitled “What is the Best Number?” This clip features Sheldon proselytizing joyfully to his disinterested friends, asking them what they think the best number is, and that “there is only one correct answer.” He reveals to them it is Number 73 and delineating all of the reasons why. His glee is selfish, as the others seem unamused. The reason for selecting this clip is to provide a short scene depicting someone in love with numbers. Sheldon is a stereotypical “nerd” and I sought to understand how students respond to this stereotype, perhaps to the idea that there is only one right answer without ambiguity. For Sheldon, his certainty plays out the

rationalization that defends against the possibility of the unknown in mathematics.

Selection 2

The second clip features Sheldon in the formal classroom setting (Season 8, Episode 2) and is entitled “Is Howard Smart Enough?” (length 4:50). In this clip, Sheldon is the teacher for a physics class but nobody has signed up because he has a “reputation for being obnoxious”. Howard offers to sign up out of sympathy but Sheldon demeans him as being not smart enough to enrol. But after being verbally quizzed, Howard meets Sheldon’s standards. In the class, however, Sheldon returns to berating Howard who acts in turn as a bad student (listening to his iPod and blowing spitballs). Howard emphasizes to Sheldon that if he is going to be a bad teacher then he’ll be a bad student. This clip is meant to depict the tension in the mathematics classroom, namely between a teacher who presumes to know everything in opposition to a student who resists the behaviours associated with being a know-it-all. As well, the behaviors of the student, Howard, might provoke students to think about their own action in the classroom as responding to teacher behaviors. After all, the clip begins with Howard proving his worth. I chose this clip to determine whether participants might read themselves with and against the concept of “proving their worth” in the classroom, perhaps by locating some of the dynamics of power and authority seen onscreen (Felman, 1982).

Selection 3

The third clip is from Season 3 Episode 10 (“The Gorilla Experiment”) and it is about Sheldon teaching Penny physics at home in his apartment. She wants to

know what her boyfriend Leonard does for a living. Throughout the clip (length: 6:57), Penny becomes confused, misses the point of what Sheldon is teaching and doesn't take notes. In other words, she does not have the qualities of a "proper" or "suitable" student. At the end of an arduous session, she breaks down crying and Sheldon asks why, and she says, "Because I'm dumb." Sheldon responds by saying he doesn't cry because he is dumb; he cries because other people are dumb. This clip is chosen because it shows Penny in tears in the face of a teacher who doesn't understand why she doesn't understand. As well, she doesn't behave "properly" as a student – taking notes, asking the "right" questions. This clip was chosen because participants might be able to identify with or against Penny's feelings, and write about their experiences as feeling either included or excluded from learning on account of being seen as, or feeling like "the right kind" of student. Sheldon's teaching is a defence mechanism for his ego against the possibility of his own failure (it is never him who is wrong in his own mind). He transfers his own his experiences of failure or fears of loss onto the object of his teaching – a defenseless student.

Participant Response: Showing these three clips offers a space of mathematics popularization that participants might or might not have considered when answering the initial questions. Participants were asked to view each clip separately, and jot down ideas between each, responding to the following questions: 1) What kind of different mathematics learners do you feel are portrayed onscreen? 2) What representations about mathematics and mathematicians do you feel are being portrayed? Due to the limited availability of participants who were only available for one interview session, they were

interviewed directly after viewing the clips rather than on another day after having time to think about them. As well, I was interested in participants' immediate visceral reactions to the clips and what struck them most. To this end, while participants might have focused on one clip preferentially over the others, this was also revealing for the analysis.

After the viewing and note-jotting, participants called me back on Skype to answer the following questions about the portrayals onscreen: 1) When you were jotting down your impressions, did you find you identified with any of the characters onscreen? 2) In what ways do they remind you of a memory or experience of learning Mathematics 10 CST? 3) If you do not identify with any of the characters, why not? 4) Do you have anything to add to this interview?

After interviews had been completed, they were all transcribed by listening to the audio files and typing the conversation between interviewer and participant into separate word documents for each interviewee. The interviews for each participant were 27 min 12 sec (Mark), 26 min 14 sec (Kate), 37 min 04 sec (Debra), 37 min 40 sec (Emily), and 29 min 02 sec (Jane). These transcripts were transcribed into Microsoft Word using the same laptop as was used for recording (no insecure transfer of files or use of multiple devices). All expressions including laughter/giggling, coughing, and other expressions (such as “um” and “ah”) were retained verbatim in each transcript to maintain authenticity of the conversation. Interviews were saved as word documents on a password secured computer, secured in a locked office, in a home with alarm system. These measures were to ensure security of the original data.

Method of Analysis

Once the interview transcripts were complete, I read through them twice each. In both instances I began picking out keywords, particularly coding for repetitions of language and themes (Robertson, 1995). Approximately 70-80% of each interview became the data for analysis. Some examples of repetitions included use of the word “understanding” in relation to failed pedagogy or the repeated phrase “breaking it down and putting it back together” when speaking about mathematical concepts. I highlighted thematic elements as well, throughout sections of the interviews. Specifically, I read the participants’ responses bearing in mind the six defences outlined by Nimier (1993). I coded each of the participants’ past (regressive) and future (progressive) responses as aligned with a manic or phobic defence accordingly, reading them in context of their past histories in the classroom and their discussion of their future goals with mathematics and lives in the present. I was looking for commonalities between participants, if they were to emerge, and also for changes as the students considered their past histories of learning and their current and future perspectives about learning. To further interpret the defences that appeared to emerge, I read their stories as indicative of the space of teaching and learning in the intersubjective space as a question of mutuality between them as students and me as teacher. Lending insight alongside my own autobiographical stories and reading the self alongside them through my past, present, and future, I began to sort out the kinds of psychic conflicts at play. These emerged largely through the key concepts offered in object relations theory, and specifically transference and countertransference. Once I completed the regressive and progressive phases, I turned to the analytic phase where the participants read themselves with and

against the characters in *The Big Bang Theory*. Using the same coding method of looking for repetitions of phrases and language, and read the students' responses with and against the characters in the show – their critiques and perceived commonalities. In so doing, a rich object relations analysis emerged that helped define the concept of the “good” and “bad” teacher (in the character Sheldon, and by extension in the students' own educational lives). Finally, in the last chapter dedicated to the syncretical moment, I return to the research questions, asking how these five interviews help us understand what kind of psychic dynamics are taking place within the space of teaching and learning, and how *currere* as a methodology might help carry research forward that takes into consideration how mathematical subjectivities are formed within the classroom and against societal tropes such as those in popular culture.

Strengths and Limitations of the Study

One of the main limitations of this study was the small participant group. It was a challenge to locate participants that were willing to participate in interviews over the months where the data collection took place. I reached out to over thirty former students and eight participants responded and five took part in the study. None of the participants wished to meet in person, in large part due to the rural nature of their locations. Those who were open to participating were able to do so if the interviews were structured under 1hr time limit because of the prohibitive cost of internet access in the country (either via satellite or expensive broadband in farm locations).

Another challenge was about the overall scope of the study. This research offers a perspective about the different (or perhaps similar) kinds of experiences held by

students who have taken the same course during the past two years in Quebec, but cannot be read universally. The short interviews of the study provided a way to reach students otherwise unreachable. Of course, there is a challenge that the participants were not able to return for a second follow up interview. There are positive and negative aspects of this. Perhaps participants might have been more fully able to self-reflect upon their experiences, making reaching into the autobiographical past more rich. That said, the spontaneous responses made available the immediate defences that surfaced amongst these young participants. One concern would be that if participants were able to craft responses about their schooling and mathematical pasts, they might rewrite themselves to please the interviewer (especially a former teacher), perhaps resulting in narratives that conform to existing discourses about success and failure in the course and/or being unwilling to critique the researcher given the chance to make that choice more fully. The number of interviews and interview length is something that might be considered for future studies in this area.

Positively speaking, the interpretive framework calls upon me to do significant work to remain critical of my own identity formation as a teacher. One challenge is to remain mindful of the difference between students' narratives and my own. The concepts of transference and countertransference demand that questions about the unconscious intersubjective relationship between researcher and participants are kept in mind as they shape the production of data and its interpretation. Using the television show as a focal point of discussion provides a way for the conflicts of identity to be projected rather than subsumed by the subjects' personal narratives. To this end, using Screenplay Pedagogy is helpful as a mode of qualitative research in how it attends to the

dynamic unconscious while remaining mindful that the notion of objectivity is not a goal of research grounded in self-reflexivity.

Chapter 5: The regressive moment

Looking at the autobiographical and educational past

I wish my teacher knew I suck at math.

I was an immigrant and my father was a mathematician, therefore I have very high expectations at home which equals a lot of stress.

Math has always been a challenge because I work too fast and don't take the time to work at my pace.

(Journal Entry, September 2015)

I wish my teacher knew...

Each fall, I ask students what they wish I knew about their past learning in mathematics as they enter my new class. Some of these statements stick in my mind and I enter them into my teacher journal to remember students' words as we begin a new school year.

What do they bring into the space? In this chapter, I explore the first of the *currere* stages. In the interview transcripts that follow, I introduce each of the participants' personal histories and their stories about past learning in mathematics classrooms. What this chapter will show foremost is that through unpacking the stories of past mathematical learning, students have a variety of defences – some manic and some phobic. In other words, not all participants experience mathematics negatively despite being enrolled in a “lower” mathematics course – the CST option. As well, reaching into the past learning scene reveals that the intersubjective space is of foremost importance to most participants – that if there is a failure to connect, or the perception that the teacher does not understand or care about the students' mathematical needs, this overrides students' perceptions of their raw mathematics abilities. Rather, the blame for

not understanding concepts, while partially internalized, seems to be placed onto the dynamic between teacher and student rather than seen as an internal failing.

To return to a definition of the regressive moment of *currere*, the lived experience of past educational scenes, become the data source. Pinar (1975b), originally described the regressive step in the following way:

The past is entered, lived in, but not necessarily succumbed to. Because one is not there concretely one is not necessarily vulnerable. One avoids complete identification with the self that was, and hence is able to observe. This is the object of this part of the method: to observe oneself functioning, in the past. Since the focus of the method is educational experience, one takes special notice of one's past life-in-schools, with one's past life-with schoolteachers, and one's past life-with-books and other school-related artifacts. (p. 8)

To generate data, Pinar et al. (1995) further explain, individuals use the psychoanalytic process of free association “to recall the past, and enlarge, and thereby transform one’s memory.... to recapture [the past] as it was and as it hovers over the present” (p. 520). It is clear that the students in the anecdotes above, now faded into my teaching past as they have moved on from my course and into the present moment, still remain present in my teaching space. I am struck by how students enter a new classroom with the weight of the expectations of continuing to “suck” at mathematics, with the pressure of a mathematician father at home, or with the knowledge that despite trying, one might work too fast and get the wrong answers.

Throughout this chapter, I explore the responses of former students of Mathematics CST 10 alongside my own to understand how our educational and autobiographical pasts intertwine. For each interviewee, I ask about some of his or her past and social and educational context. Asking quite simply (rather than specifically) about participants' past learning allowed individuals' stories to begin flowing, where they were able to recount past experiences in the mathematics classroom and in general. Provided with this free associative narrative, I was then able to better understand defences in the unconscious and flow within in the intersubjective environment of the classroom.

Kate's Story

Kate is a former student of a rural high school in Quebec. Coming from a family on social assistance who lived through periods of homelessness and/or financial distress, Kate graduated and attended CEGEP (College) for one school year in Early Childhood Studies. She left because "she wasn't loving the program." She currently lives on her own in the city but is unemployed and is considering going on social assistance like her mother. We began by talking about Kate's high school experience, leading to the question: *How might you describe your past experiences of learning mathematics?* The transcript begins as follows⁸:

Kate: It was tough for me, because I wasn't like you could, like you taught me so...

Intvr: *Right.*

Kate: ...you knew I was average. It was very difficult at times especially with different teachers, just because it took more like in-depth learning for me.

⁸ For all transcripts, I have listed myself as "Intvr" – short for interviewer.

- Intvr: What do you mean by in-depth learning?*
- Kate: Like more one-on-one time like actually getting it and getting it down, it took me a while to get stuff.
- Intvr: So, you said you were average, like what do you mean? Why do you consider yourself average?*
- Kate: I was like below 70.
- Intvr: So, it sounds like you feel like that is something not exceptional?*
- Kate: Yeah, I don't feel that it's exceptional at all though.
- Intvr: So, okay. My next question would be how do you feel about mathematics itself, and how has that feeling maybe changed over time?*
- Kate: In itself I feel that it's difficult for a lot of students. It's hard to grasp a lot of the concepts, but over time you get it. Like in time I started to like math, when in the beginning I just, I couldn't stand it.
- Intvr: So, why do you think it improved?*
- Kate: Mainly because I had a good teacher, and whatever I asked it would be answered in the way that I could comprehend...A lot of instruction I don't like how a lot of teachers just slip right through it without really explaining it, which I get it because there is a lot of criteria, but it takes a lot more for the students to learn it, instead of just browsing past.

Interestingly, Kate's interview begins with a vague remembrance, "Well you taught me, so..." Recalling our mutual time together back was for her implicit. Immediately in the interview, I felt I should have read her mind somehow, but thankfully she jumped in to explain: "...you knew I was average." These sudden statements return me to the scene of our intersubjective space, our time together as teacher and student. As Stern et al. (1998) remind us about the regulatory process of the intersubjective dyad, there is indeterminacy in the relationship, perhaps not recognized by both parties. In the interview, as in the teaching space, I had no concept of the fact that Kate perceived me to think of her as "average," or a recognition of her anxiety about

not learning (“it takes a lot more for students to learn it, instead of just browsing past”). Yet this “moment of meeting” in the interview becomes an emergent space “that alters the subjective context” (p. 910). In other words, in the regressive moment of *currere*, Kate and I are beginning to establish her free associative view of the intersubjective environment that was our mutual teaching and learning space, and the flow between her unconscious defences (“In the beginning, I couldn’t stand it...”) and the actual space of mutuality whereby the learning takes place. In this interview, also an intersubjective space of meeting and moving forward together in our discussion of her educational past, I am attentive to the ways our past educational experience together is a “negotiation [of] the interactive flow so as to move it forward to grasp what is happening [between us], and what each [of us] perceives, believes and says in the particular context, and what each member believes the other member perceives, believes, and feels” (p. 910). The interpretation of each other does not have to be accurate, nor bidirectional. After all, I neither affirmed nor denied her assertion that she might be “average” in our interview, nor did I do so back in our classroom time together. The regressive turn of *currere* allows us to live suspended in the free associative remembrance of past learning, where Kate goes on to say, “it took me awhile to get stuff” but already having prefaced her experience with the implication that I “knew” she was average, “below 70.”⁹ The thought never crossed my mind, but it is key to learn here that students might read the teacher as seeing them as average or exceptional as part of teaching.

Reading Kate’s assertion that, for mathematics, “in the beginning, I couldn’t stand it,” is tied to her assessment of me as the right kind of teacher in the space. I feel

⁹ In Quebec, 60% is a pass in all courses, not 50%.

myself pulled toward my own past memory of learning high school mathematics in this moment. I had a Grade 12 Mathematics teacher who failed to teach the whole unit of conics. I remember leaving the government exam and she was standing outside the examination room grinning, and asked me “did you get me 100% so I can be teacher of the year?” Filled with hate towards her, I said no, and walked away. Even at 16 years old, I felt she had betrayed me by lying, by failing to do her job. As Kate goes on to say that, “a lot of teachers slip right through...browsing past” the concepts, my fears returned. Drawing on Winnicott (1992), Britzman (2009) describes countertransference in education as as the trouble of hatred in education. I am brought back to the scene of Courtney here, where my conflicted feelings of horror and hate emerged. Britzman reminds us that hatred is difficult to understand for the teacher who might be ignorant of its countertransference onto the children because “hatred breaks through the veneer of idealization of the analyst’s and teacher’s self and the profession’s fantasy that the analyst only wants to be the good analyst and the teacher only loves children” (p. 97). In looking at my approach with both Courtney and now with Kate, I ask was I this teacher who uncaringly browsed past the concepts for Kate? Kate’s description of the less-than-ideal teacher of her past as perhaps uncaring or uncommitted is nevertheless something she “gets” (justifies) because “there is a lot of criteria” to teach in the subject. Yet by moving along whether all my students get it or not I ignore, or perhaps “cannot confront the defences of idealization and omnipotence in [my] teaching, [thus denying] real contact with others” (Britzman, 2009). For her part, in Kate’s reading of the teacher, we might turn to questions of the unconscious defence at play in her mathematical learning. Taking the concept of *repression* from Nimier’s (1993) typology, it is possible to understand her statement as one where mathematics is merely something to be done in

an obligatory manner, imposed upon the student by a teacher by students seen by the teacher as ruining her lessons by not getting it the first time.

Looking at Kate's narrative of repression, without the teacher to give meaning, or to break it down in-depth, there might be "the absence of any personal relevance" in learning the subject (Nimier, 1993, p. 30). What I might read about Kate's repression of mathematics as something to be hated unless meaningful instruction is combined with meaningful relationships, and that students are able to learn "over time," is that the intersubjective space of mathematics learning nevertheless has the potential to fail altogether, rendering students like her as simply average in their own vision of the past. I struggled, just like Kate with the relationship between my mathematics teacher and me after high school. Feeling a failure for not knowing what I couldn't possibly know, having not been taught it, I repressed my fear and anxiety towards the subject until I was assigned to teach it. As Kate tells her story, I am returned to the scene of my own learning past, a weaving of our *currere* journeies. In so doing, I begin reliving the horror of not-learning mathematics, even though I would never intentionally betray my students by failing to cover the curriculum. However, as the "subject presumed to know," I feel the weight of the responsibility for our intersubjective relationship renewed as she justifies a crack in the perceived relationship.

Emily's Story

Emily is the oldest child of her family, which is well respected and well known in the rural town where she grew up. Her mother is a school principal. Emily is a high academic achiever. She scored above 90% on the Mathematics 10 CST government

examination. She went on to take the Mathematics 10 (Science Option) course in the eleventh grade, and scored above 90% on this examination as well, securing her entrance to an Honours program in Social Sciences with Math at a CEGEP in Montreal.

Dissatisfied with the program's organization and indicating that it was not what was advertised ("because we were this honors group, the teachers wouldn't exactly teach us the material. They kind of just like give us a book and [were] like here you go"), she returned home to her town from this course to pursue local opportunities. She indicated that she is exploring other educational avenues at this time while working and tutoring high school students in this interim year. When asked about her past educational experiences, Emily's responses were as follows:

Emily: Okay, so ah, I always found math, like kind of more of a challenge for me. Like every other kind of subject, I always found it came naturally to me, whereas math didn't. I have always had trouble with accidentally switching numbers as I was doing math. So it would be like 13; I would write down like 31 or something.

So like I would understand how to do the formulas but when it came to the actual practicality of doing it. I would always have trouble with that.

Intvr: I see, that's interesting, keep going.

Emily: But like I found math interesting, because I like being able to, like whenever there is patterns to doing it, I like stuff like that. When there is patterns to like write the formulas. But I always had trouble understanding, like why we needed to use the formulas kind of thing. I like understanding the reason behind doing things.

But for sometimes in math, you kind of just need to know this is what you do. And not understand the whole reason behind what you are doing, like why you are doing it.

Intvr: So are you saying you would prefer to know more like were the formulas came from? Or are you are you saying sometimes you just need to do it sometimes.

- Emily: No, like I always found, like you know about this, you need to use this formula for whenever you are doing like triangles. And I just like I wanted to know more about like why do I have to use this specific formula for triangles like what's the reason behind, just because I like to understand like the whole, like front, like beginning, middle and end, where it was more kind of, like let's just do this.
- Intvr: Yes.
- Emily: And then the result, which I, like I would like to understand the whole thing, not just do this, and get this.
- Intvr: *That's so interesting. So in some ways, what I am hearing from you is that, sometimes mathematics, which tries to do this good job of explaining things...fails to explain why you are doing it.*
- Emily: Yeah, exactly. Like you don't understand why you need to use this formula, only that this is the formula you use to get this answer.
- Intvr: *Exactly, yeah.*
- Emily: That's what I always found difficult about that.
- Intvr: *That's excellent. So do you think adding more things like deriving the formulas or proofs would be helpful?*
- Emily: Yeah, like that would be helpful just because like I know there are some people like they don't think like me, and they will just be having the formula and they will just do it. But I know there are some people who like understand, like well why, why we are using this formula kind of.

In her recollection of her past learning, Emily describes math as always having been a challenge for her but something she finds interesting. Yet implicit in her association with the past is an anxiety that can be read again through Nimier's (1993) typology as *repression*. She unconsciously signals the problem that mathematics might be "something that you are told to do, and which repeat, a bit like a machine" (p. 30). What Nimier describes in this typology is a drive that is missing whereby the doing of mathematics might be indifferent or absurd because the "mathematical signs become

meaningless” (p. 31). This unconscious defence comes into play in the intersubjective space where communication between the teacher and student apparently rests on a fundamental breakdown. Where “some people... don’t think like me,” Emily states that for her, it is important to “understand like the whole, like front, like beginning, middle and end... not just do this, and get this.” It is not sufficient to be taught by someone who is merely delivering bland concepts that don’t attend to the question of “why you need to use this formula, only that this is the formula you use to get this answer.”

Thinking through the mathematical objects (formulas themselves) as a form of discourse, Emily seems to feel that there is an important relationship that must be built with the numbers. As Emily engages with the formulas, she wishes to know them, to “get the whole thing” and not feel fractured in her relationship to the operations that confront her. Boylan and Povey (2009) describe this relationship to mathematical calculations using Heidegger’s phenomenological underpinning as “being with others” and go on to describe the numbers as others who “have a mind of their own” and who can be sometimes “uncooperative or untrustworthy” (p. 56) as in Emily’s experience with the numbers 13 and 31. The response to not getting to know these others which take over the life of the mathematics classroom is a feeling of disjointedness or pointlessness, as in a failed relationship with a person – like in a passing relationship where one does not get to know someone deeply. The difference is that the interaction with both the mathematical operations and the teacher conveying them in the classroom is compulsory in Quebec. Unlike being with others in the world, the relationship is predicated on a mandatory intimate relationship that guarantees no mutuality.

The failure to derive the formulas, to have a proper introduction to how they came into being, and hence not know them deeply, is a failure of the intersubjective space as well. If the trust between teacher and learner always moves toward a common goal, understanding how to calculate triangles using a formula that is acontextual to the learning goal – without derivation or meaning – is a betrayal of that mutuality. I felt this precise betrayal with my Grade 12 mathematics teacher. As a 16 year old, I took mathematics concepts and formulas to be true unto themselves. When presented with abstract concrete facts, unlike Emily, I was comfortable repeating them in their own right. I could memorize the algorithms. However, what Stern et al. (1998) describe of “moving along” in the moments defining an intersubjective environment is a *dual* reliance upon the verbal and implicit in the relationship. As such, psychic damage occurs when the verbal component does not *reciprocally* “foreground the consciousness of both partners” (p. 910). For Emily, if a teacher merely conveys information, rendering the recipient voiceless by either being unable to ask the learners what they need, or diminishing the teaching to a matter of delivering cold concepts, the “movement towards intersubjective sharing and understanding” is lost (p. 910). For me, the memory etched in my mind of a teacher wondering if *I* got *her* 100% on the exam is the betrayal of the verbal and the implicit. The relationship I had with the teacher was irreparably one-sided, but I did not know this, unlike Emily. I felt we were bonded together toward a common goal whereby if I learned all of the mathematics perfectly, our reciprocation would be complete. I did not find out that my blind trust was betrayed until the critical moment. Emily reveals my blindness again. Even though the goal of performing highly on Alberta’s government exams (in my case) or having my students understand the mathematics principles (in Emily’s case) might be mutual, one of the structures enabling

its content is irreparably damaged. I did not attend to Emily's need for reasoning and rationale in learning the numbers she was taught to use.

Mark's Story

Mark grew up in a small town outside of the rural community where his high school was located. After graduating as a funny and outgoing Class President, he went on to complete his first year of Police Foundations and he is continuing this program presently. He was offered a position in the Canadian Armed Forces in two trades: Steward in the Navy and Artillery. However, he declined both offers to continue his path to become a Military Police Officer, which he describes as "all [he ever] wanted to do." Splitting his time between the city and going home to his town to see his family, Mark plans to complete his program this year and reapply to the Canadian Armed Forces. Mark responded to the questions about his past learning in our conversation below:

Mark: Well, growing up I liked it up until Grade 8. I found it not too difficult and easy to comprehend. In Grade 9 was a little harder but I still enjoyed it but it was just like you had to sit down and think really hard and concentrate if you wanted to learn it but I didn't have the kind of patience for it so I just wouldn't catch on.

Intvr: How do you feel about the subject in general? You like math or has your feeling about it changed, like you like it and then you didn't like it?

Mark: No, math's all right, I like it.

Mark's responses were generally brief throughout the interview. However, in recalling his past learning, I note his recollection of natural ability as a youngster. Until

Grade 8, mathematics came easily to Mark but he had to begin working for it in Grade 9. I note that his enjoyment of the subject did not change on account of it becoming more difficult, and that he centres the blame on himself for not “hav[ing] the kind of patience” for it and that is why he did not “catch on” as quickly. Mark’s identity work in this brief response asserts his independence from the teacher. His success was dependent on nothing else but his own (lack of) patience, but that mathematics itself is “all right” and something he likes. Reading his response within Nimier’s (1993) typology, Mark as a very confident extrovert exhibits the manic defence of *reparation* wherein doing maths is part of feeling like “you’re doing something that comes from you” (p. 32). He has to sit down hard and concentrate, but being clever or patient is a quality that resides inside him as a person. His positive affect seems to be unproblematically tied to being mathematically successful and easily adopted within his personality. At the same time, his lack of perceived overachievement – though he passed the course, he sometimes didn’t get it – is a veiled distancing from obligations within the past learning space. Locating himself away from any questions that might convey weakness, we’re left with the impression that the “doing of mathematics” is quite interior to Mark’s identity – a life problem to be solved alongside the problems on the page.

Debra’s Story

Debra lives a different small town from Mark, about 25km from her high school. She was a quiet personality in class, but warm and generous to her close friends. She opted to not attend CEGEP after graduating, working two part-time jobs instead and living at home instead of in the city. She was working towards completing Grade 11 Science Math and Physics at the local Adult Education branch at the time of this interview. She

added that her experience of Adult Education is “not as intense as doing it in high school. Because you do it, book by book, right? So, one book is conics, one was optimization and stuff like that. So it’s not as heavy as doing everything in high school where everything in one year or week.” Debra was taking these more advanced high school courses to apply for a competitive college program in diagnostic imaging. Her dream is to be an ultrasound technician. When asked about her past with mathematics, Debra had positive things to say.

Debra: Math has always come easier to me than other people. So um, like I didn’t really realize it in elementary school. But when I got to high school, I did realize like oh wow, this is something like more natural than my French and English and all that, so...

Intvr: So it was a positive experience?

Debra: Yes very positive [chuckles].

Intvr: That’s fantastic. ...How do you feel about this subject, or like has that feeling changed over time? Like do you still feel you have a good, um, you said a good experience?

Debra: Yes I have a good experience with it. Because I can grasp it better than other people. So it’s very, a good ah thing. Yeah, like we use math every day, right? Like we might not use it, like the geometry or whatever. But we still have to use it every day basically.

Debra’s recollection of her experience is interesting because she refers to her elementary school years as a time where she did not realize her own mathematics ability. She is pleased with the discovery in high school of her ability – one that surpasses her skills in other compulsory courses such as French and English. As well, she is “better than other people” which defines her experience as one of competition. Both of these aspects might be read through the unconscious defence of *introjection*, whereby “mathematics gives ...some order” (Nimier, 1993, p. 32). Immediately, I feel admiration for Debra

because my own experience with mathematics was not this way. I struggled through school to focus on mathematics, only reaching the height of my abilities in Grades 11 and 12. Mathematics has always been about coping, disorder, and overcoming obstacles to me. However, Debra seems to gain a sense of stability from doing mathematics in a classroom unlike the other subjects where she feels less capable, particularly in relation to her peers, and the subject offers a way of testing this through its measured outcomes. The use value makes the learning of mathematics meaningful to Debra, and is something she can carry around with her outside of the classroom learning space. She does not mention the classroom teaching until the very end of the interview:

Intvr: And I don't know if there is anything to add, or that you want to add to the conversation.

Debra: I want to add that, like you know how you just said that you had a really good math teacher and made you keep going, well you were my math teacher.

Intvr: Oh, I appreciate that. I appreciate that so much. It really makes my whole day.

Debra: No problem.

Intvr: Thank you so much.

Debra: It's true though and I know for a lot of people that you were their math teacher. Because you just you put it in a way, where everyone can understand. So it's just, it was great.

The final words Debra wished to add onto the interview steer us back to the intersubjective space. The desire to learn might have been fuelled by the perception that my classroom instruction opened up a space of mutuality whereby the relationship with the subject was about more than just whether or not Debra was naturally good at mathematics from elementary school onward. Whether I was effective or not, in

Debra's perception, the view that "a lot of people" benefitted from a certain kind of instruction and so that "everyone can understand" underscores the importance of the bounded subjective experience that is learning. To be more clear, if Debra's perception was that everyone could understand what was going on, day after day, then she perceives a motive in the intersubjective play between teacher and student whereby that motive is to convey information meaningfully while building a relationship. Debra's understanding might be read as working towards the common goal defining *implicit relational knowing* that is "enacted to micro-regulate the content of what is being talked about and to adjust the intersubjective environment" along the way (Stern et al., 1998, p. 911). If one were to fail to forge the intersubjective relationship, this would imply that there was an absence of attentiveness to the errors and repairs in the relationship (and in the teaching) as the year unfolded.

To be certain, this is merely Debra's perception of the mathematics learning space of her past. It is not a conclusion about how effective my teaching might have been or about the learning experience for all students. Thinking through the principles of object-relations theory, I am drawn by Winnicott's (1969) short paper on "The Use of an Object" wherein the infant fantasizes about destroying its primary object (the mother) and that the mother's ongoing survival convinces the infant she is a separate person. In surviving, she can be employed for productive ends. As Frosh (2012) reminds us:

All these ideas converge on a general notion of *trust*. If the world is trustworthy, it 'holds' the child, and because of this the child's 'true self' can grow, rather than be hidden behind a conformist 'false self' that desperately hides its feelings because it needs to be accepted by an unreliable or needy parent. (p. 135)

I have thought about Debra through this lens, as her trust was implicit for me. Perhaps in testing the boundaries of our learning together, Debra's breaking free of being accepted by the system and being her own mathematics learner allowed her to look back on our relationship as trustworthy. Even still, reading my previous participants' responses (i.e. Kate), I note my own anxiety about being the unreliable parent. In both Debra's and Kate's interviews, it is only *now* (not at the time of being in my class) that they describe the conditions they feel were necessary for the mutual relationship to succeed. In testing the primary object of mathematics instruction (the teacher), I failed Kate and even Emily sometimes when the formulas were not made clear. Returning to the scene every day, 'intact' as it were, was a test just as the infant tests the unreliable parent. The self-preservation was not always successful for students as they did hide their true feelings until this moment of a research interview, perhaps pointing to how the histories of schooling demand conformity to its instruction techniques and the practice of not questioning the teacher too much. Happily, if surprisingly, for Debra, her recollection speaks to "moving along within a framework that is familiar to and characteristic of each dyad" (p. 911). Debra's experience is not characterized by the same unconscious defences as Emily's (and they were in the same class). Somehow we managed to create a productive dyad wherein she felt the trust remained intact. What I am beginning to feel from the difference in participants' experiences is an increased pressure or even anxiety that the countertransference working back from me onto "the students" is monolithic (as one sometimes responds to a whole class emotionally or teaches a concept in blanket fashion). Each student is interpreting the dynamic of trust in a different fashion, and for some I remain the not good enough teacher, and for others our trust is built and is reciprocal.

Jane's Story

Jane is a student of Venezuelan descent who moved to the rural school in Quebec in grade 10. She came from the Ontario school system. When she graduated, she was not sure what she wanted to do, so she travelled a great deal and has been working. Her aspiration as she enters college is to become an accountant like her mother and says she “has the genes for it” but paradoxically hopes it has nothing to do with mathematics because she “can’t remember the last time [she] took math.” Jane feels that she would really love an accounting job and seems familiar with the software her mother uses and competent in learning how to do the same thing. In speaking about her past learning, Jane had this to say:

Jane: I think my past experience is kind of rocky to be honest. Just because first I started mathematics in [Ontario] and then the transition to Quebec is a little bit different. But there’s a grade different as well I was kind of mixed up because you learn things in different stages.

When I moved to Quebec there were certain things that I had already seen and then certain things that I hadn’t seen that I would have learned later on in Ottawa. It was kind of rocky I was very, my grades were very unpredictable because certain things I would get really well and then other things it would take me a lot longer to understand.

Intvr: Right. I remember you switched in high school, what grade was that?

Jane: I switched in Grade 10.

Intvr: How do you feel about math as a subject?

Jane: I’m kind of like bipolar about it to be honest because I like it when I get it but when I don’t, I get really frustrated easily. Especially now going into college and having a little bit of experience in college I find a lot of it is a little unnecessary for the path I want to go into. But it’s frustrating to still have to take certain courses in order to continue on my career even though it’s not related to my career path whatsoever. That’s how I kind of feel about it, kind of unsure of how I feel but...

Intvr: *That's totally fair. Has your feeling changed over time? You mentioned that a little bit with switching provinces but thinking about when you were a little kid until now, let's say.*

Jane: Yeah, it did change because when I was little I used to love math and I always really good. But then getting older and getting to the college life I think it's really just, some things are just unfair and unnecessary to learn because it's not like hand in hand with my career path but it's a necessity for my career path. It's kind of like why do I need this if I don't need it for my career?

Jane's education was marked with a large transition in mathematics learning from one province to another in a critical year of high school. Having moved in grade 10, she faced new, more difficult concepts in the Quebec school system that is compressed into eleven school years rather than twelve as in Ontario. Jane's experience is a mix of positive and negative emotions, leading her to having felt her experience as a "rocky" path. She loved the subject when she was little on account of being "always really good" but then the defence of *repression* emerges, and she expresses that her current mathematics learning is "unfair and unnecessary." Feeling that mathematics is imposed upon her, she seems to convey that it "doesn't represent anything meaningful... so uninvolved" (Nimier, 1993, p. 31).

It is possible to understand Jane's repression through Klein's paranoid-schizoid position, wherein good and bad feelings are attached to the same object, as in when the baby at once feels comforted (as when being fed) and betrayed by the mother (as when waking up alone). This is the concept of splitting, where "both people and events are experienced in very extreme terms, either as unrealistically wonderful (good) or as unrealistically terrible (bad)" (Waddell, 2002, p. 6 in Black et al., 2009, p. 21). Feelings about mathematics for Jane seem also to be ambivalent and a combination of extremes,

as her desire to be an accountant is mixed up with feelings of mathematics as being unnecessary. Jane seems to be seeking another, displaced “real” mathematics to be located elsewhere in the void yet to be filled by attending an accounting program in the future. While she does not speak to the teaching while at high school specifically, her rocky trail of learning, unlearning, and relearning concepts has forged her view of mathematics as unpredictable and discomfoting. Though it is a memory to which she returns with mixed feelings, one gets the sense that she feels compelled to continue with some form of mathematics in the future – perhaps as a strategy to secure the self in the scene of being an accountant, to strive to locate mathematics as meaningful and to finally possess it.

Reading the regressive moment

In introducing the stories of my participants, I rely on a body of research that asserts that individuals’ narratives are not simply reflective of people’s identities; rather, they *are* identities (Bruner & Weisser, 1991; Clandinin & Connelly, 2000; McAdams, 1993). Bruner (1986) asserted that people live “storied lives” and beginning with the early educational days of the participants is one way to understand how the concept of self unfolds for each of them: “Self making is a narrative art, and through it is more constrained by memory than fiction is, it is uneasily constrained...” (p. 65). Going further, Bruner asserted that if individuals were unable to understand the self through story, this would amount to a disorder, “dysnarrativia,” which leads to a falling-apart of identity. In *currere*, which is “running the course” of stories, going back to one’s educational past helps us understand how my former students might hold particular

beliefs about what the mathematics classroom (the intersubjective space) might look like and how early childhood experiences become formative for how they saw themselves at that time.

In this chapter, I have pulled apart the past to understand some of the multiple subjectivities that reside within individuals in the mathematics learning space.

Appelbaum (1995) emphasizes these concerns as central to understanding what constitutes mathematics and doing it by asserting that:

Particularly at issue are (1) the ways in which we form and maintain understandings of the subjectivity of the student, and (2) the implications of such notions for relationships among students, between students and teachers, between students, teachers, and members of the larger community, and for claims about ‘knowledge’. (p. 17)

In keeping with attending to these goals, it was clear that not all learners exhibited the same defences. There were tensions between personal beliefs about what was valuable in mathematics teaching and the expectations for proper pedagogy. In the case of Kate and Mark, some of the tension seemed to be pervasively *interior* to the subject as learners who were either not capable (as average in Kate’s description, or impatient in Mark’s). For others, there was a duality where multiple subjectivities were at play. For Emily, this took the form of the interiorization of a problem with the complexity of numbers for Emily (the mix-up between 13 and 31 which was a personal struggle) and the externalization where the “other” (the teacher) was the site of distress – someone

who should teach *why* formulas are the way they are, not just *what* they do to get answers.

In all cases, I learned that, while repression in the form of the belief that mathematics was simply obligatory or boring was the most common defence, this was not how respondents exclusively felt. Reading myself alongside these participant responses, I note that as a learner, I also felt that mathematics was obligatory (but not boring). My experience as a young person who felt duty towards the formulas and their outcomes underscored the relationships I built with my mathematics teachers, even the one who failed to teach an entire unit. Taking the blame onto myself for not knowing better (that she was a failed teacher in her own right), I still read the scene of my own learning as a troubled one. This influences my pedagogy as I try to be clear and helpful to my students, even if it means taking on too many after-hours tutoring sessions or losing my lunch hours. The desire to make-up for my educational past as a teacher in the present is a constant attempt to repair the space of mutuality that was broken in my past.

For my participants, I read defences of repression, reparation, and introjection. Interestingly, this diversity of defences challenges the fairly common notion of “lower” mathematics students as having negative affect in relation to learning mathematics. More interestingly, in each of the participants’ narratives, we see the permeability of the space of declarative (unconscious) knowledge and the implicit knowledge of the intersubjective space. The declarations about mathematics learning were combined with comments about relationships and mutuality – as in the assertion that I might have been “*the* math teacher” for a number of people, unbeknownst to me at the time. Though the “moving along” process (Stern et al., 1998) is unique for each teacher-student pair, the

tendency to externalize the belief that others might think the same way helps to understand the internalization of the intersubjective space. If Debra felt happy and secure, she had the perception that others did too. This enhances the concept of mutuality beyond the teacher-student dyad where by the feeling of a collective belief is a “moving along” that included other students. Perhaps this is one feature of the *implicit relational knowing* whereby the common goal of working together is all too obvious: to understand the mathematics and pass the government exam. On the other hand, it might be more than this. The implicit goal might read, for some like Debra, as a means to capture the feeling of security in the crowd: since she was getting the material, everyone must feel safe alongside her in the space.

Chapter 6: The progressive moment

Imaginings of the future

Last year, I had an online teacher and I like to be re-explained questions sometimes. Looking forward to a real teacher.

I tend to enjoy the parts of science where I can see its relevance in everyday life... I love astronomy and I want to be an astronaut!

(“I wish my teacher knew,” Journal Entry, September 2015)

Mathematics and mathematicians now and in the future

As I move forward into the next step of the analysis, I wonder how defences are rearticulated in the progressive moment where “one looks toward what is not yet present, a form of free association inviting fantasies of who one is not now, of what is felt to be missing, sought after, aspired to” (Pinar, 2010, p. 178). In his essay on the subject, Pinar (1975b) explains the progressive stage fully:

In this step we look the other way. We look, in Sartre's language, at what is not yet the case, what is not yet present. We have found that the future is present in the same sense that the past is present...Try to discern where your intellectual interests are going, the relation between these evolving interests and your private life, between these two and evolving historical conditions. Perhaps you will begin to see something of the interdependent nature of your interests and the historical situation. (pp. 9-10)

A key part of what Pinar asks in the progressive stage is for participants in *currere* to think openly and imagine the self with and against the future moment. In this section of the dissertation, participants were asked to consider historical conditions and the links between private life and public discourse. In this section of the analysis, I offer a

reading of participant responses to the general questions: “What comes to mind when you think of a mathematician in society?” and “What, if any, role do you see mathematics having in your everyday life now and in the future?” Both of these questions open up the space where participants can imagine the mathematics as embodied (as mathematicians – whatever the image of one might be) with and against their own use of mathematics as young adults. The results lend insight into how mathematics moves out of the intersubjective space of teaching/learning in the classroom to the outside world, filled with popular narratives, explicit curriculum goals, and various mathematical operations, among others. These are the public Discourses that pervade everyday life and which constitute the historical and social conditions in which “we” – the participants and me – find ourselves presently.

Kate: “They were always really into math”

Intvr: So, if I were to say the word mathematician, like what sort of image, or what kind of people would you consider to be mathematicians?

Kate: Right off the bat, Bradley and Cassia¹⁰.

Intvr: Oh really? Why Bradley, and Cassia?

Kate: I don’t know they were always really into math, and they always tried to help me whenever I like needed help. I’d go talk to them about like anything about math. I could talk to them about it, and they would try to explain it the best that they could, and normally it would help me.

Intvr: That’s good, so your image of mathematician is someone who is helpful?

Kate: Yeah.

¹⁰ Both of these names are also pseudonyms. They were classmates of Kate’s.

Intvr: That's good. I'm curious about people would think of mathematicians in society, what kind of person would I look like? Any thoughts on that front?

Kate: I would think more scientist, like even with a mathematician Einstein automatically pops into my head.

Intvr: That's a good example, so like a physicist?

Kate: Yeah.

Starting from the end of this line of questioning, we can see Kate's somewhat predictable naming of a public figure – Einstein – as an ideal mathematician/physicist. After all, he is one of the most popular historical figures of the 20th century and has experienced a revival in popular culture in posters, memes, and Internet jokes. Calling forth Einstein might simply be fantasy figure drawn from the image of the historical and mathematical conflated together because Einstein is someone Kate can't seemingly say much more about, but who occupies a place of status in her imagination.

However, Kate more deeply associates the image of a mathematician with the people immediately surrounding her, two other students in her class who seem to have internalized mathematical knowledge they can bring into their future lives forever. In this first intersubjective moment in the transcript where interactions between students is featured, Kate experiences a “moment of meeting” that is “jointly constructed, requiring the provision of something unique from each party” (Stern et al., 1998). This is called *specificity of recognition* in the intersubjective space, one normally characterized by mutual actions between mother and infant; for example, when a mother's behavior with a sleepy baby might trigger a change in the baby to fall asleep. In the moment of meeting between Bradley/Cassia and Kate, the goal-oriented structure is to achieve understanding in the mathematical concept on the page that Kate cannot seem to

understand directly from the teacher. With Bradley and Cassia helping “as best they could” and Kate normally finding herself in a place of understanding afterward, there is a mutual fittedness in the relationship.

Delving further to understand Kate’s response in terms of the Lacanian unconscious, mathematical knowing (which we might term “the Other”) occupies a place of lack for Kate, who previously has named herself as “not exceptional.” For Lacan, subjectivity is structured around the unconscious drive to fulfil the lack – an interminable striving into the future. It is possible for the Other to refer to the entire subject-Other interaction, as in Kate’s interaction with mathematical concepts, which can never be attained on the first try. The constant striving is a somewhat unachievable struggle for wholeness. Kate recalls her intersubjective relationship with Bradley and Cassia as they appear to promise a filling of the void. Though her response is a type of *reparation* wherein there is a desire for “restoration of the good object...that is the basis of the ego’s capacity to maintain love and relationships through conflicts and difficulties” (Nimier, 1993, p. 32), we cannot forget the idea that desire exists liminally between need and demand. Kate cannot totally satisfy the lack – a deficit between these two things. She needs to know the mathematical concepts and approaches her peers to find out how to possess them; however, in never fully coming into being the same way Bradley and Cassia do, her subjectivity still remains fractured. As articulated in the literature review, if the entry into language is where the infant becomes a subject, alienated from itself, one might contend that Kate’s constant striving to fully enter the world of mathematical language is never quite achieved. Her gaps in mathematical ability define the lack that structures her subjectivity.

When I was listening to former students recall what they think the image of a mathematician is in society, it occurred to me that I have never documented my own responses to this question in my journals. I started making a list of my own, and I began writing down names: Andrew Wiles, Srinivasa Ramanujan...historical figures like Euler, Gauss, Bernoulli. I only returned to this list upon writing a draft of this dissertation. Why are there no everyday figures on here? What about my teachers at school and in university? What about *me*? Perhaps like Kate, I see myself as average as a mathematician. I can do it, but I am not a genius. I teach children, I like the formulas very much, but it strikes me that just as the participants see themselves as part of a course that is lower, I see myself as lower also. This tension has always been important to me as I see my future as an education researcher. I correct people all of the time that I am not a *mathematician*, just a teacher of mathematics to children. I have spent countless hours looking at the course outlines for undergraduate mathematics degrees at Carleton University, University of Waterloo, University of Ottawa, and others – wondering if it would be a bad idea to throw all sense to the wind and enroll as an undergraduate again. There are Bradleys and Cassias out there in my imagination as well, and I strive to fulfil the lack as the fantasy that I might be capable of succeeding in mathematics more authentically. However, a future without a mathematics degree, where I have confronted all of the formulas in “real” mathematics classes, is a future with a hole, an emotional void unfulfilled, and certainly a journey not taken to know whether I can really hack it or I am an imposter on account of “just” being a mathematics teacher.

Emily: *“I am always trying to do mental math”*

Intvr: *In what context do you think of mathematics outside of school?*

Emily: Um like I do think of mathematics like outside the school. Because like I, I am living like on my own kind of thing. So I always, like whenever I am going I grocery shopping I am always like doing like mental math. Every time, like I am picking up an item kind of thing. I will pick up an item and be like, “Okay this is \$5.99 and then this is \$6.49”

So I am always trying to do mental math. Because at the end I always want my goal to be under \$50. So like I’m constantly like picking up stuff and then putting stuff back. Because I know like it’s not going to be equal to \$50 at the end. So it’s like, it’s interesting that I do that without even really realizing that, like using math. Like it just kind of seems like a second nature kind of thing.

Intvr: *Is it like part of your life?*

Emily: Yeah, like it’s not like actually realizing, with oh I am actually doing mental math, like I am just like thinking. Like okay this is my goal and I just want to achieve that goal without realizing like I am actually doing like math to get there.

Intvr: *You know it’s not like you really stop the whole world, I am going to do some math now.*

Emily: Yeah, like a piece of paper and like writing down.

Intvr: *If you were to think about society, what kinds of representations are out there, if someone was to say, well mathematics, or mathematicians more specifically. What would come to mind?*

Emily: Ah, mathematicians.

When I hear that, I just think of like, like someone like professors at school, who are like older and like they have glasses. Like I just, like they don’t seem, like they just seem like professors they don’t seem like everyday kind of regular people. Higher level.

In Emily’s response we read her use of mathematics in the present. Having had some trouble with reversing numbers in the classroom, Emily’s response of using mental

mathematics in everyday life as she embarks on a future of budgeting as an adult feels like a fresh narrative altogether. In this *introjective* defence, she seems to use mathematics as part of “find[ing] connections between different things... allow[ing] [her] to develop good reasoning” (Nimier, 1993, p. 32). She uses mathematics as a tool to “get there” in her life, giving it order when it is most crucial – to live within the means of her budget. Emily’s dismissal of images of “higher level” mathematicians like professors who “don’t seem like regular people” squarely places her in the progressive stage whereby her fantasy of mathematical competence is not to become this older, glasses-wearing person. Rather, the ideal for her is the passing of mathematics with and through her life “without realizing it.”

The notion that the classroom mathematics which seemed to lack meaning somehow kicks in “behind the scenes” in Emily’s everyday shopping experiences. Emily’s rehearsal of her present moments in shopping upturns the stress associated with her past mathematical learning as knowledge *about* mathematics. Bibby (2009) further explains that “what is notable, talking to children of all ages about knowing and learning, is the extent to which they **know** that what and how they know content is bound up in relationships” (p. 126, original emphasis). If students are fearful of the incoherent and inchoate in mathematics (see Britzman, 2003) and this amounts to fear of contact for Emily with formulas (and perhaps the teacher who delivers them unthinkingly) that seem to have no derivation or meaning, then her removal of mathematics from the place where trauma resides resets the concept of learning and doing mathematics well.

Mark and Jane: “Doing math right”

Mark: Do I really use math myself?

Intvr: Yeah, use math or think about math.

Mark: I try to figure out how much is being paid, how much is being deducted by the government.

Intvr: Do you think your classroom experiences helped you with that or you think, did it make a difference?

Mark: Yeah, well it taught me how to use math right.

Intvr: If you were to have an image of what a mathematician looked like or an image of like mathematics in everyday life or in society somewhere, what would that look like for you?

Mark: Right now I’m kind of thinking of Good Will Hunting, whenever he’s on the board and he’s just...

Intvr: He’s doing all the equations? Why Good Will Hunting?

Mark: I don’t know. It’s just the person that jumped to my head.

Intvr: Is there something special about Will in there or Matt Damon?

Mark: Well it’s just because the professor was doing it all and the janitor, everyday guy would just come in and gets all of the questions. Sometimes math isn’t hard as it has to be.

Here I am struck by two aspects of Mark’s response to thinking about mathematics in the future. The first is similar to Emily’s in that there is an *introjective* aspect to his response – namely, that school somehow taught him to “do math right.” By imposing the binary of rightness against wrongness, he associates having material wealth with doing math a particular way. Given that one cannot control government deductions, just as one cannot control the prices at the grocery store, possessing the skills conferred by former schooling are made more meaningful when the rules are easy to predict. As Nimier (1993) notes, for some individuals, certainties of mathematical calculations

become a place of reliance where there is comfort in “absolute necessity governed by rules which admit no exception” (p. 32). Mark also brings together the idea that there is a real world applicability to mathematics even as he invokes the Hollywood film *Good Will Hunting*. Will’s character is an “everyday guy” who works as a janitor and he clarifies the mysterious, hidden world of impossible mathematics by “getting all the questions” on the chalkboard in the hallway of the university. The mathematics, for Will, was easy even though his life isn’t. Mark sees mathematics as something necessary for a good future, invoking the most extreme example, someone in a conventionally “low” profession – a janitor that can do advanced mathematics. Since mathematics is accessible for Will, it can be accessible in a different way for Mark, too. In other words, Mark once again does not put mathematics on a pedestal as something he cannot confront in his future; rather it is a necessary part of one’s identity in one way or another. Jane’s thoughts about mathematics in the present moment are similar to Mark’s:

Jane: I use it only when it comes to, just very simple math. In accounting most of the times it’s very simple math, adding, subtracting, dividing, multiplying and stuff like that. It’s not like we have any major formulas and even working with my mum it’s nothing really major. Most of the time the system itself does it for you. I don’t, besides just the adding, subtracting, multiplying and dividing I don’t really use much of math in my life.

Intvr: *What about mental math? Do you sort of compute things in your head or is it something that you use or?*

Jane: Yeah, I do work as well at my job I do tend to touch money a lot. So I’ll do like certain math at the end of the night where we have to punch out and cash out as well I just do like the mental math but that’s it.

Both participants read mathematics as possible for everyday people, again located interior to the subject. Jane talks about accounting as simple math that is not confounding. There are no “major formulas” and the computer system does the tough calculating. In her case, I sense the defence of *projection* in Jane’s response, as though going beyond simple calculations might risk destruction. In this typology, participants often see mathematics as lacking personality and that to delve too deep might involve risk. The resistance to go deeper into the “unnecessary” formulas, as Jane described previously, is a way of avoiding losing her way, which is a threat to subjectivity, as to be “on the verge of destruction” (Nimier, 1993, p. 31). For Jane, mathematics is easy when it is just adding, subtracting, multiplying, and dividing, so long as the machine takes care of the rest. Where some individuals might attribute confusion to mathematics, Jane’s desire to oversimplify accounting to rote or banal activities is a comfortable way of “backing away” from the complexity of that which has no personal expression.

For both participants, mathematics is viewed as something people make harder than it really is, invoking the juxtaposition that perhaps there are two kinds of mathematics: the fantasy of impossible mathematics (that doesn’t have to exist for Matt, or is unfair/unnecessary for Jane) and real mathematics (accessible to everyone). This has everything to do with the image of the mathematician as well. Like Mark and Jane, I feel that the fantasy of impossible mathematics (to me) takes place in “other locations” – like the intimidating hallways of a Mathematics Faculty or in competitions run by men. I find it interesting that taking comfort in the possibility that mathematics is open to everyone, even janitors, Mark’s analysis reminds us that one might get by in the world unhindered by fear of the subject. By rejecting the projection of fear or mystique onto

the calculations, Jane and Mark become willing to engage with operations that ground them in doing the subject “right” when mathematics is needed for meaningful things.

Debra: “I kind of get a little thrill out of doing it”

Debra: ... like when I am doing my time cards at work. I count out my hours and then you know like easy stuff like that. When you are just spending your hours and then timesing it by your pay, and then it comes out to like a good pay. So you are just like hey...

Intvr: So you are saying you sort of get like instantaneous feedback that can be quite emotional, even.

Debra: Yeah, I get that. I kind of get ah, I kind of get a little thrill out of doing it though. Like counting my hours, and then counting how much my pay is going to be. I get a little thrill out of it so...

Intvr: That’s fantastic, that’s a great example. So if I were to say maybe you think about the word mathematicians in everyday society like what kind of representations or images might come to mind for you?

Debra: Um, I don’t know, I guess, a mathematicians because it sounds like a magician right? As someone having a magical kind of, I don’t know how to explain it. But, they are so good at math that it is like magic to them. Like they can snap their fingers and they already have their solution in their head and they can just solve it, any way they can. Because they have so much knowledge of the subject.

Intvr: That is interesting, are there any figures if you were to put a face to that?

Debra: Not really no. I just think of someone up at a chalk board and writing really fast. Because they already know the answer, and they have to show their work. So they have to write it really fast, but they already know what they are doing.

When Debra describes doing mathematics and why it is a positive experience, she associates the pleasure of the mental math with the “thrill” of getting her paycheque correctly calculated. This defence is one of *reversal into the opposite* whereby the doing of mathematics might give pleasure. We saw this a little bit in Jane’s responses in the

last chapter, when she said that if she doesn't get it the first time, she gets frustrated. However, for Debra, her manic defence is in keeping with her pleasurable view of mathematics in general – as something she has always been good at – and now something that gives her happiness as she calculates her pay.

The reason I read her defence as reversal into the opposite is because of the description of what her vision of a mathematician might look like. As described in Nimier's (1993) typology, often reversal into the opposite includes the feeling of peace that goes with doing mathematics properly (and not wrongly) but is also tied closely to the belief that some people can inherently do mathematics and some cannot. He explains that "so mathematics, through its rigour, that is to say through its constant refusal to entertain ambiguity, will more than any other discipline, revive anxieties arising from noticing individual differences" (p. 33). So just as Debra is excellent at calculating the mathematics for her daily life, the realm that belongs to mathematicians is also one of "magicians" who can just "snap their fingers" and know the answers.

An interesting addendum to Debra's vision of the mathematician is someone who is forced to "show their work" despite already knowing the answer. The person at the board works feverishly to *do* mathematics, to *show* it. Debra distinguishes her own relative ease with the subject and her ability to do it against the trope of a mathematician who seems to be *chosen by* the subject. As an identity claim, as Mendick, Moreau, and Epstein (2009) remind us: "This different relationship between ability and enjoyment is what enable mathematics to be inscribed as a truth about the self that can be realised by choosing mathematics. However, it means that this choice is not the active work of self-creation; they are more chosen than choosing" (p. 78). Debra at once inhabits the space

of having mathematics work for her needs, as part of forming the self, but does not feel especially recognized for her abilities nor does she seek that out. Her thrills are private, not like the mathematician who rushes to show everyone their work on the chalkboard.

Reading the progressive moment as relations of Transference and Countertransference

In reading the progressive stage of *currere*, I return to the psychoanalytic concept of transference and countertransference as interpretive frames. For Freud, the psychodynamics of the patient/analyst encounter are shaped by things that are transferred from the past onto the relationships of the present. Starting with an original scene from the past, the new edition is a translation and rewriting of the original, “a framework within the patient relives the original plot without realizing it...[and] her or his way of relating to the new environment is governed by a storyline that was originally developed for a different one” (Frosh, 2012, p. 188). In the reading of the progressive moment, I do not wish to artificially read myself as analyst and the participant as patient, because a therapeutic relationship was not the point of interviewing people. However, I tried to keep my own position minimized by not interjecting into what my interviewees were saying as they spoke about their present relationships with mathematics and vision of mathematicians. What is notable is that, like in the therapeutic relationship, it was possible to read how former students defended with/against high school experiences and their statements became an externalization of some unconscious fantasies. To that end, where the patient displaces “an unconscious idea from the object to which it was once attached onto the person of the analyst” (Frosh, 2012, p. 192), I would contend that the

interviewees displaced their unconscious ideas onto a) mathematics as something omnipresent in their lives, and b) the fantasy of the ideal mathematician, even as I might not live up to that fantasy in past remembrances.

For me as a teacher, I also displace my unconscious ideas in the same way through countertransference. The fantasy of the ideal mathematician relieves me of the duty to be like one. Because I cannot perform with formulas and “show all my work” at the highest level, having never taken an undergraduate degree in mathematics (and I question whether I would be capable of doing so), I feel less obliged to fit into the trope of the fantasy mathematician as gifted and natural. On the other hand, my life lived in the present with mathematics is one where the abstract idea of good pedagogy is transferred onto *any* subject I teach. Because of my strained past relationship with mathematical operations and a teacher who betrayed my trust at the critical juncture between high school and university, the conflict plays out as my resistance to appear to be a mathematics specialist at all. I am quite comfortable instead in generalizing my work as one of a “mathematics/science teacher” (even in my email signature block), so that it is all conflated into one job. I seemingly work hard to erase the possibility that I somehow have to be a mathematician at all.

Going back to Jane, we can read her anxiety about mathematics that is “unfair” and “unnecessary” in the classroom environment as being replaced in the progressive moment by mathematics that is totally practical – the future in accounting that only requires basic operations. She, like Mark, brings mathematics into the scene of reality – where doing mathematics “right” strengthens the ego. (She wants the subject presumed to know, *to know* mathematics.) There are tangible outcomes like understanding your

taxes, for example. A separation of mathematics as fantasy (weird, somewhat faceless professors for Debra and Mark, for example) and mathematics as reality (paycheques and mental math for all participants) is a revelation of the psychic dynamics in contemplations of the future which draw on past mathematical experiences. In the progressive moment, we see how the defences come to play differently than in the past. For students, the process of working through the progressive stage helped uncover statements that, generally, reveal a state of manic defences where mathematics is transformed to participate in “a defence against anxiety” (Nimier, 1993, p. 30). The table below is a summary of the defences revealed in reading participant responses through the first two stages of *currere*:

Participant	Regressive Stage Defence	Progressive Stage Defence	Movement
Kate	Repression	Reparation	Phobic → Manic
Emily	Repression	Introjection	Phobic → Manic
Mark	Reparation	Introjection	Both Manic
Debra	Introjection	Reversal into the Opposite	Both Manic
Jane	Repression	Projection	Both Phobic

Table 1. Defences interpreted from questions in the regressive and progressive stages.

Looking at this table most generally, I note that participants had different responses in all cases to the remembrance of past (classroom) experiences of mathematics than in their present realities and fantasies. This means that even for students who carry with them generally positive affect about mathematics from school, there is a different

transferential dynamic in the progressive moment than the regressive. As well, with the exception of Jane, the present moment tends to have manic defences, whereby participants have re-framed mathematics positively when thinking about their futures.

Though this is a general trend, what it means is that the unconscious feelings about mathematics in the intersubjective space are not necessarily fixed as students leave that space for lives outside of formal schooling. For Mark and especially Debra, their manic defences were heightened, and mathematics is both a useful tool and even something that gives them pleasure. For Jane, her repression of school mathematics leads to a coping strategy saturated in overcompensating rhetoric, wherein she projects the negative experience of useless school mathematics onto the practicality and ease of accounting software she plans to use in her future, just like her mother does for a living. For Kate, likening the abstract concept of “mathematician” to her classroom peers brings the reparative fantasy of being average close to home – within reach, since after all, she would approach Bradley and Cassia and they would talk to her and help her. As well, in asking the initial question of who one might consider a mathematician, Kate immediately chose real people and was not compelled to give a historical figure until I pushed the line of questioning. This means that for at least some participants, the fantasy of the present, of “what one aspires to” in Pinar’s terms, is readily accessible.

Chapter 7: The analytic moment

Viewing *The Big Bang Theory*



Sheldon Cooper, “The Gorilla Experiment,” *The Big Bang Theory* (t-shirt available at www.cafepress.com)

“Overachievers...and the ones like me”: An object-relations analysis

In the analytic stage of *currere*, one analyses both past and future. Pinar (2010) explains that it is “akin to phenomenological bracketing; one’s distantiation from past and future functions creates a subjective space of freedom in the present in which one asks the following: What is this temporal complexity that presents itself to me? (p. 178). Put another way, Pinar (1975b) reveals that:

In this part of the analysis, one may profitably utilize non-educationist interpretative systems to generate data. For example, psycho-analytical and neo-psycho-analytical systems, gestalt systems, politically and sociologically focused systems can be put on as if eyeglasses, and looked through. Note the view visible through these lenses. Once taken off, look at these interpretations.

... What clearer light do they focus on the present? Interpretative schema must make more visible what is lived through without them. (p. 11)

By asking participants to engage in the analytic process about their own past experiences in an unconstructed or meditative way would be much too abstract. To generate analytic data about what complexities of past, present, and future selves might emerge, I first asked former students to watch the three clips from the *Big Bang Theory* described in the Research Design (see Chapter 4). I read the responses of the participants and of myself rhetorically, once more looking for repetitions of language that indicated what unconscious desires or defences might be at play as per the methodology of Screenplay Pedagogy (Robertson, 1995). In this chapter, I have indicated these repetitions in bold in the interview data. In analysing both the clips and speaking to both teacher and students' personalities, experiences, and identifications with and against the scenes, I was able to read the past and future through the artefact.

Object Relations and Consuming Television

Appelbaum (2008b) in his analysis of consumer culture and mathematics, gives us some insight into how the participants' analysis might unfold using object-relations theory. He asserts that:

There is never a moment in which any human being is not already steeped in a history of relationships – to other objects and of one's environment. In fact, a person could be understood as an expression of the ongoing creation of relations of objects of self.... (pp. 169)

Appelbaum goes on to assert that consumer culture is about vision, where “‘coming to know’ is hegemonically equated with perception” (p. 170), particularly in mathematics where teaching is about striving to have students *see* a particular way of doing something and then *show* what they have learned. If the scene of education is wrought with consumer culture (for example, selling knowledge in the classroom that will be useful in one’s future job, or the “buying and selling” of teachers and administrators in the job market), then everything becomes an object of consumption. With this in mind, I consider *The Big Bang Theory* as a form of public pedagogy (Giroux, 2000) – one of many objects to understand participants’ object relations with mathematics overall, both inside and outside of the classroom space.

Screenplay Pedagogy helps us to understand popular culture’s critical and counterhegemonic potential as seen through the eyes of the participants. *The Big Bang Theory*, for example, is a “funny” show – and not just literally. On the one hand, as a form of public pedagogy, it sits outside the school as a site of teaching and learning. On the other hand, even though it rationalizes how people at the margins might be accepted (“geeks” and “nerds”), it has succeeded in creating a new normal whereby *geek chic* is a thing to be championed and embodied (look at the rise of phenomena like ComiCon/Comic-Con conventions and CosPlay). Does this make a show that began by championing identities that reside on the margins, now popularized, another way of mainstreaming what it means to be the “right” kind of geek? And since the show’s setting is derived from the academic hallways of a university physics department, how porous might we consider the lines between school and entertainment? Has the school become a fictional site where comedic antics override the learning that goes on there?

Screenplay Pedagogy gives us an analytic “way in” by understanding participant responses in terms of how they approach the characters, their relationships to each other, and their relationships to the mathematical objects. As well, participants can read themselves in relation to the images portrayed onscreen – popular culture that is a pedagogy itself. In this vein, I heed Giroux’s use of the concept of the public intellectual in making sense of education without reducing it metonymically to mere “schooling” (Schubert, 1981, 1997). As such, participants are *not* asked to read the show as a rehearsal of acceptable tropes of the conventional school setting. Rather, they were asked to speak freely about the show, their feelings about it, and if anything struck them. Bollas (1987) describes “transformational objects” to argue that some objects that grasp and encapsulate us, linking our psychic and outer worlds, and we can be changed by these objects. Lebeau (2001) rehashes Freud’s thoughts describing film as “the royal road to the cultural unconscious” (p. 6). Keeping these two assertions in mind, I asked participants what they felt about the show and how their feelings might relate to their sense of self as *any type* of learner, whether these were similar to the show’s characters or not. Participants’ words became an interesting portrayal of visions of their past, present, and future selves through this process. And we learn how a popular culture television show representing mathematics intersects with the objects of constructed classroom learning along the way.

Below, I offer a second vignette – a viewing experience of my own – that rehearses for me the ways in which society continues to inform my views of mathematics through the important, all-pervasive cultural messenger, television. As you will read below, my childhood experiences and the conflicted feelings of both loving

and hating mathematics is reactivated by watching a popular sitcom. Bearing in mind that television is not merely the product of culture and actually goes back to shape it again (and shapes students and schooling), I seek to understand my personal psychic conflicts in relation to mathematics through this television show: *The Big Bang Theory*. In using popular culture with my participants, I specifically attend to the analytic and synthetical stages of *currere*, where we extend beyond the past and future remembrances and look to the larger picture, “totalizing the fragments of educational experience (that is to say, the response and context of the subject) and places this integrated understanding of individual experience into the larger political and cultural web” (Pinar, 1975, p. 424). With a common artifact that represents mathematics-knowing and its personification that cuts through all demographics (I have watched the show as have my participants and most other people I know), I am able to understand through a common language of discussing the show, the intensified subjective engagement with the world through personal experience that is both the project and outcome of this study.

A viewing experience

June 2, 2016: I love the Big Bang Theory. I sit down to watch another out-of-sequence episode (I can never get it together to watch them in order!) and settle in. Sheldon is teaching Penny physics. This ought to be good. She is no good at this, always seeking fast answers to complex problems. I think of my mother teaching me world history at the dinner table. She'd love this episode. "There will be tests!" Sheldon exclaims! Ha! Not just one! If Penny is going to be like her boyfriend, she better get studying. At the end, even though Penny can't learn anything meaningful, she's an expert in the

performance of physics in front of her boyfriend, Leonard (success, after all?). He buys it, even for a second. I wonder if my rehearsal of all those history facts at the dinner table was such a performance. I think I understood it at the time, though. I'm not an imposter like Penny.

This is a show I have only ever seen on television. I don't own the series, and I tune in when it is on. My comfort in *The Big Bang Theory* rests in its invasion of my private life on account of what I consider a random scheduling coincidence: I flip on the TV and there it is! Set in the familiar scene of my own comfortable home, entering the home of Sheldon and Leonard to watch the plot unfold, I have memories of my own childhood – of watching serialized television with my mom in the same unplanned fashion, after those dinners where she asked how my day was at school, what I learned, and to remember that there are important tests for everything. Now retired, my mom was a well-respected, even masterful world history teacher in Alberta. Her students always did well and I did well. I had blind faith in her methods, and I remember the importance of learning the facts, not just parroting them, rehearsing them. Actually, what kind of performance was it – my schooling? Do I feel compelled to watch *The Big Bang Theory*, a show where school and home intersect for the very reason that it makes me feel uncomfortable? Or perhaps the opposite – a reassurance, that “I’m not an imposter like Penny”? At the same time that I enjoy the moment where Penny “gets” Leonard spouting off the physics facts and he believes she knows what she is talking about, just for a minute, I feel unease, even anxiety. All of the struggles in my life to learn things properly seem overshadowed by this moment, this poor performance. Yet I identify

with Penny, having lived much of my life on a quest to know things, and admittedly, to be recognized for it sometimes.

Simply reading the show for its plot, characters, and scene does not seem adequate to unravel the power of the complex and often contradictory feelings in this one journal entry. How can one attend to the feelings of past learning, of ambivalence, loss, desire, and a kind of “knowledge” one gains from the viewing experience, having completed the episode, and just sitting there afterward on the couch? The relationship I have with *The Big Bang Theory* changes me each time I sit down to let an episode unravel, and it helps to unpack the educational scene of my life through the basic, and even passive, act of viewing. The response to the show says something about the show itself – as a powerful affective force that returns me intensely to other scenes of my educational past. My journal entry also strikes me as an unclarified muddle of questions relating to memory and identity. What might my responses signify, and how might they help me understand my ongoing relationship with learning as an individual, and moreover as a teacher? In analysing my response, I notice that I overtly sympathize with Sheldon, the supposed holder of “real” knowledge who nevertheless struggles to teach an unwilling or perhaps incapable student. And perhaps my relationship with my mother was fraught with the dual recognition of her brilliance and anxiety that I was the incapable student. My relationship with this text – this show – brings me back to the scene of learning inside the family space. Somehow, through its repetition of the anxiety of being the bad teacher and bad student, has become creatively intertwined with the emotional chaos of my own subjectivity.

The Bad Object?

In interviewing my participants, I turn to Kate's viewing experience first, to uncover her perspective on the characters in the show::

Intvr: What kind of people do you think maybe are portrayed in the video?

Kate: Well Penny, she is more the one that doesn't get anything, that you need to really explain things to, go into depth, and you need to explain things on her level.

Intvr: Right.

Kate: Then there is the weird one I forget his name.

Intvr: Howard?

Kate: Yes, Howard. Him he knows what he is talking about, and **he knows what others are talking about, but he likes to be taught as an equal.**

Intvr: Right. So you do think that's an important part of learning, like being treated as an equal?

Kate: Because then it gets students to pay attention.

[Break in the Skype interview as the participant attended to her cat getting out of hand.]

Intvr: No that's fine. I'm just looking at the characters in the show and I guess what I'm trying to do is see what some of my viewers think about the show.

Kate: Very attentive and having your own opinion on itwithout getting input like [with] Sheldon is complete criticism from the moment you open your mouth. He is right about everything 100%. But then like Howard and Leonard they are, **it's not that they enjoy the criticism, but they take it, and then they put it back into their work** knowing exactly like what should be put back into it.

Intvr: So, do you think he is helpful or?

Kate: Sheldon?

Intvr: Sheldon yeah.

Kate: No he is very opinionated and not in a good way. Sometimes in a good way but most of the time it's just that criticism that **they can't take because he thinks his work is above all.**

Intvr: Exactly, so then it's interesting how they sort of reflect a lot of the stuff you're saying. So, when you were watching the show did you feel like you identified with any of the characters?

Kate: Penny.

Intvr: Why so?

Kate: Because I'm not that attentive.

Intvr: Oh that's interesting, so you kind of identify with her the way she is as a person?

Kate: Yeah but also not like it takes a lot more than just a simple explanation to get through to me.

Intvr: Exactly, okay cool, and what does the show remind you of in any specific moment from our class or from math CST in general?

Kate: All the time.

Intvr: Really?

Kate: Yeah, over achievers then you have the ones like me who need a lot of explanation and to be really carried throughout the course and the other people that instantly know what you're talking about.

In reading Kate's response to the television show, I first return to Britzman (2003) who describes the difficult nature of education:

There is, in educational life, something paradoxical about how the unconscious can actually be considered, particularly because...the needs for tidiness and simplicity, so tied to dreams of mastery, prediction, management and control, are all idealizations that defend against the loneliness of institutional life. (p. 98)

Bibby (2009) paraphrases Britzman's thoughts here to say that "if we could manage to bear not to know, to tolerate the emptiness and loneliness of not knowing, then we could start to learn differently" (p. 124). Kate, in viewing the clips, reads Sheldon as the embodiment of someone who knows everything all of the time. He is set in place as the ultimate object of mathematics – total mastery. Interestingly, instead of railing against this symbolization, Kate seems ambivalent. At first, she says he is opinionated "not in a good way" and then she qualifies this with "sometimes in a good way" but emphasizes the criticism Sheldon has of everyone is something "they can't take." Thus, as the show's star, Sheldon, stands in for the idealisation of education – as the fully-formed subject presumed to know, in the Lacanian sense. Though he is hated, he is given more opportunities and chances to redeem himself in the episodes than the other characters because of his exhibitions of raw intelligence. Kate recognizes that all of the people around Sheldon, in the intersubjective space that forms their friendship and working relationships, have to simply face him, *whether they like it or not*. Kate describes this as a sacrifice whereby Howard likes to be taught as an equal but foregoing that, both Howard and Leonard realize that they simply have to "take [Sheldon's criticism] and then they put it back into their work knowing exactly ... what should be put back into it." It is a mixture of extremes – rejection of Sheldon for his attitude, and acceptance of his mathematical knowledge. Begrudgingly, Howard and Leonard must accept that they are lesser geniuses than Sheldon and realize he is correct most of the time, definitely not socially, but always mathematically.

My reading of Sheldon is ambivalent as well. In my journal entry of August 19, 2016, I write,

Sheldon is actually someone I want to be...secretly. I mean, I wouldn't want to be him exactly. I think I am a bit of Howard and a bit of Sheldon, but I wouldn't want either one of them in my classroom. Wait, I have both of them in my classroom!

I think that the mixture of extremes in Sheldon's personality leaves me stuck between recognizing that perhaps I have aspects of his personality in my own teaching – a desire to be perfect and to be heard by my students. On the other hand, his horrible personality is made obvious by Howard who plays the “bad student,” sending spitballs across the room and listening to his iPod. In the face of Sheldon's bad pedagogy, I begin to sympathize with Howard, but in so doing, recognize Sheldon has the holder of some kind of “supreme” knowledge. Why would I want to be this person or to forgive his social transgressions?

Sheldon is the bad object in the scene. He gets away with being obnoxious, personifying the unapproachability for many of raw mathematics equations when they are shoved in your face in the classroom. Bibby (2009) reminds us that it is “education's valorisation of knowledge and knowing that idealises it: education as the turner of keys, the opportunity creator, the economic driver” (p. 124). To that end, Sheldon embodies the painful sacrifices of others. Kate laments that, perhaps unlike Sheldon, “it takes a lot more than a simple explanation to get through” to her. Perhaps my own desire echoes Kate's. The teaching and learning of mathematics is for me, as for her, both laborious and necessary. Just as Penny struggles with being accepted because she is an outsider, Kate, to belong to the social group needs things explained to her. And notably, nowhere in Kate's interview does she describe quitting mathematics. She emphasizes her slow

pace and lack of attentiveness, but never the desire to leave the scene of mathematics learning altogether. We see this in Penny's constant arrivals at Sheldon's door and her hanging out with all of the physics crowd in each episode. She stands in for the good object – of reliability, stability, and perseverance, despite her inabilities. Even though she could leave for a more conventionally normal social group, she remains on the scene, episode after episode.

For Penny, as for Kate, intersubjective space is predicated on an interrelationship where someone knows mathematics and another needs to know it. For Kate, who seeks out help, her peers did not alienate her. Penny experiences alienation, particularly in the episode where Sheldon tries to teach her and she doesn't get it (an episode which includes Sheldon's now famous line, "I feel sad because others are stupid and that makes me cry" – a phrase you can now buy in various t-shirt designs all over the Internet!). The scaffolding holding the relationships together on the show is clearly mutually dependent for the *Big Bang Theory* crowd. Penny is conventionally "normal" with mainstream notions about society, living, emotions, and with regular habits. The others need help in this regard. Kate sees herself as average, and the rhetorical distancing of her reading of self as *not* an "overachiever" seems like a protective mechanism. She *can* identify with one of the TV show characters while sympathizing with the nerds who aren't the embodiment of total mathematical knowing, while at the same time justifiably removing herself from the things Sheldon represents that are bad about mathematics.

Breaking and Reassembling

Reading Mark's response gives us some more insight using object-relations theory. In psychoanalysis, objects include "the people and parts of people towards which love and hate are directed" (Frosh, 2012, p. 128). This is why people can talk about objects in personified terms, for example, mathematical equations as persecuting or punishing. The relationship goes back-and-forth whereby the subject makes meaning, or is formed by the object, but also where the object changes the actions of the subject. In Mark's reading of Penny, he describes the dismantling of the object that is mathematics followed by its reassembly:

Mark: I saw, I think I saw two [kinds of learners]. There was Sheldon seemed to just understand like everything is, no matter how complicated it was he's picked it up and then there's people **like Penny where it has to be broken down, but it's broken down into those segments and structures she can pick it up easily and understand it.**

Intvr: *Do you think in the clip where he's trying to teach her physics she's actually picking it up?*

Mark: Well after he **broke it down and made it simple, more simple. I think she started picking up those parts and then she was able to put it all together.**

Intvr: *Yeah, awesome. If you were to say then what representations of math, how is math portrayed in these clips?*

Mark: Well there's like Sheldon who's a brainiac and then there's like, I don't know what his last name was but the one with the spit ball [Howard]. He knew his math but he didn't wear it on his shoulders. Like he was nonchalant. But I find like Sheldon is like more in your face about it.

Intvr: *Yeah, exactly. Did you feel like you identified with any of the characters in the shows if you had to identify with one?*

Mark: Maybe Penny.

Intvr: *Why Penny?*

Mark: Because I think I learn the same way as her when it's **broken down to the smaller segments and it's simplified it's easier to pick up and then you can put it together yourself.**

Focusing on the object of mathematics, Mark reminds us that Sheldon (the bad object) is “in your face.” A sentiment that Mark repeats three times (highlighted in bold) in this segment is the desire to take the mathematics and “break it down” and then “pick it up and then...put it together yourself.” Thinking through this as a matter of consumption, if the object is broken down, then Mark is able to pick it up, put it together in a new fashion, and then possess it. His reading of Penny's (in)ability is also interesting, as the episode ends with her obvious incapacity to follow through on that exact process. Mark thinks that Penny was able to “put it all together” when in fact (as in my own anxiety-ridden viewing experience indicates in my vignette), she merely parrots the concepts back to Leonard without understanding anything. Both of Mark's defences in the regressive and progressive chapters are manic, and so we see his desire to internalize mathematics in whatever way possible.

Rehearsing the trope of education that Appelbaum (2008b) describes, Mark feels that if a learner can just see the parts of mathematics, he or she can consume them and own them. Interestingly, the show is predicated on the impossibility of breaking the primary object of impenetrable mathematics down: Sheldon himself. His character is resilient. He always gets his way and never learns anything mathematical from his peer group. In some ways, I read the scene of my own mathematics learning this way. I did not have any help and I always learned the course by myself. Even as a teacher, I prefer

to learn from books about how concepts unfold, not from other people. This is paradoxical given my daily role as someone whose job it is to convey mathematics concepts to other people. Like Sheldon, I resist mutuality in the intersubjective space as a student but unlike him, I try to overcome it as a teacher.

Sheldon's character development in the show focuses solely on his social failings, which are repeated time and time again. In other words, the show's success depends on the comfort we feel when we tune in and the primary mathematical object is unchanged, week after week, despite his trials and tribulations socially, which include embarrassing himself publicly, acting obsessive compulsive in his personal space, and failing in romance, among others. In an ideal system of *implicit relational knowing*, the mutuality is regulated by a common goal and both parties experience a shared affective space. The example Stern et al. (1998) give is that of a child climbing a ladder at the playground, and finding himself at the top, feeling nervous. But reassured by the father, who moves closer and nods, the child goes to the top of the playground with confidence. Both people intersubjectively share "the affective sequence tied to the act" (p. 909). In episode where Sheldon attempts to teach Penny physics, they do not share the affective sequence in the learning environment because the two characters do not learn anything from each other or grow together. The polarization of good and bad object of mathematical knowing remains set in place. In Mark's response, we see the desire to read the space otherwise. He believes that Penny (doing all of the sacrificing) actually learns from Sheldon, and that he gives her the ability to break down the mathematics into understandable chunks. For Mark it doesn't seem to matter that in fact her only success is succumbing to Sheldon's desire for *himself* to perform socially later on by

using her, when it appears he has succeeded in teaching Penny. In reality, we know she just memorizes some facts to impress Leonard. Thus, possessing the “idea” of mathematical performance by an “everyday” character is, in some ways, more important than possessing the mathematical object for real.

The “good enough” teacher

Looking at the response to the show by a different interviewee, Emily, I am brought back to the fundamentals of object-relations theory, particularly the ideas of Winnicott (1958, 1969). In infant-development, the child has two major life forces: aggression and eroticism, both tied to the body and distinguishing it from the world (a boundary of the self and the not-self). In the early relationship with the mother, the infant has an internalized sense of “being *thought about* by another... [resulting] in the conviction that we are never truly alone” (Frosh, 2012, p. 135). This establishes the basis of trust, and the world nurtures the child in its self of wholeness. However, since the mother is the site of both the good and bad, in the denial and provision of things that satisfy the infant, the mother is unreliable. The child begins to experience limits to the wholeness of self in relation to this unreliable mother. This becomes the basis for the concept of “good enough” mothering, and the emergence of the baby as a separate self. Just as the infant is now able to express ambivalence towards the mother, I now look at Emily’s response, which follows, and how it fits into a framework of the “good enough mother.” Contained within one structure, the television show, the bad object remains as symbolized by Sheldon, and the good object by the other characters, especially Penny who is Sheldon’s foil. Emily’s response elucidates the complex relationship we have to

objects, in this case by her multi-layered response to the way the “objects” of the show are handled. Let’s begin with Emily’s substantial reading of the scenes she viewed:

Emily: So I found that they were like, there were a couple of different ones [learners]. So for example, like Penny she seemed interested to learn as long as she didn’t have to do any work to prove that she understood what was being taught. So she just wanted to just kind of hear about, like what Sheldon had to say, but **she didn’t actually do any work to get to understand it.**

Intvr: Yeah, like to acquire that knowledge.

Emily: Yeah, she just kind of wants to sit and then have him tell her what everything was. But didn’t want to actually do anything for it. And she didn’t really want to know the full story, she **didn’t want to have the full understanding.** She just wanted to kind of know what the second parts were, and then other parts she just didn’t care to bother learning.

Intvr: That’s awesome, that’s great.

Emily: And then for Howard like he was interested to learn. But as long as he didn’t feel as if he was being, like felt stupid. Like as long as Sheldon didn’t make him feel stupid, he would be willing to learn. He already had prior knowledge but he just wanted some help with, like with the stuff that **he didn’t understand.**

He is willing to put the work for it. As long as he didn’t feel like stuff that didn’t understand, that was like **bad or like reflected badly on himself.**

Intvr: Never actually, never thought of it through that way, like somehow it sort of speaks back to yourself right?

Emily: Yeah, and then for number two, what representations of math, or mathematicians. Um, so like if you take Sheldon for example, he is like a know it all and believes that everything he says is interesting. Or that everything he says is understandable to everyone.

Like all his information is coming across as clearly, like to himself, to everyone else. Like he doesn’t understand that just because he said something, **not everyone is going to understand** what he means by it.

When he is saying like the formulas for physics, he understands what they mean. But he doesn’t understand that just by telling someone else, what it is, they are not exactly grasping it. So like **he doesn’t understand that** so...

Intvr: So, how do you think that makes him as a teacher?

Emily: Well, he is **not a good teacher**. Because he doesn't understand that other people can't grasp what he's already known for years just by him telling. Just by him saying, this is what it is, other people grasp it they need to come to it themselves, **understand it in a way that works for them**, and he is not adaptable to the different types of learning.

Intvr: Right.

Emily: He is kind of, like the **only way he would be a good teacher**, is basically to teach people better or the same as himself.

When it comes to teaching Penny. He is not patient with her, and when it comes to teaching Howard he is, he makes him feel stupid for not being as higher of a level as he is.

Intvr: Great. So do you think Sheldon thinks there is anybody who is actually as smart as him?

Emily: No, like I don't feel like as if he thinks there is anyone that's at his level. Because like whenever he is in a clip he is talking about what is the perfect number, and like they are all interested like okay like let's try this and Raj says the number, like that **he thinks it's good**.

But he's like, no and he just shut them down completely. And they are all like okay, and then he continues to explain **why it's a good number**. But at that point they are already done, like with the conversation, because it's made them all feel as if they are inferior to him. By not knowing that 73 is the best number.

Intvr: So when you were jotting all this stuff down, and viewing, did you feel like you identified the other characters or if not, why not?

Emily: I think I identified in some ways with Penny and identified in some ways with Howard. **Because like I wanted to understand, whenever I am learning math, I wanted to understand it**. But there are some times where like I don't want to have to put in as much of the work to understand it as is needed sometimes.

But then for Howard I felt like him, because there are sometimes, that I want to learn, I willing put in the work. But I don't want to be made to feel stupid if I don't understand like right away. Like where if I have to ask a couple of

questions, like if I have to say can we go back to the beginning. I don't want to be **made to feel like it's bad** because I didn't get it the first time around.

Intvr: So does this show, remind you of any specific moments from learning, Grade 10 math, or math in Quebec in high school more broadly?

Emily: Hmm yeah it did in some ways. Like the episode where Sheldon was teaching Penny physics and she was just so frustrated because **she didn't understand it at all.**

There has been some times, where I have been, reviewing notes or like working with someone else on that. **And we've been going over it and they've said, "Okay do you understand this part?" And I said no. "Do you understand this part?"** And both of us would just kind of be, so upset like both of us would be like well we don't know what we are doing. And we'd feel stupid because we didn't understand it.

Intvr: So, you are saying it's that emotional.

Emily: Yeah, it's **like you take it personally that you don't understand. Like you should understand it. You did everything to understand** but you just jolt, like something didn't click when you were learning it. So then **you feel as if you weren't smart enough to understand it.**

In this portion of the interview, Emily first dismisses Penny, who symbolizes the good object, because Penny is unwilling to "prove" that she understood mathematics or "do any work." In reading Appelbaum (2008) against Penny's refusal to be a good salesperson of her knowledge, she then becomes "denied...a new object and new relations" (p. 170). Emily, unlike Mark, reads the learning scene between Sheldon and Penny as reciprocal. Mark describes Penny getting it when Sheldon breaks down the concepts *for* Penny (which isn't true). But Emily puts the weight on both the good and bad objects of mathematical knowing together – Penny's failure to engage and Sheldon's failure to communicate properly by being a "know it all." Both objects might be symbolized in polarity but they have their failings to hold up to their symbolizations as well.

In this section, I have highlighted in bold Emily's use of the words "good" and "bad" throughout the dialogue as well as her use of the words "understand" and "understanding." I was struck by her repetitions of these words. Emily ascribes "bad" to learning situations in which the subjectivities are threatened (either hers or Howard's). These include when Howard shouldn't be made to feel the learning "reflected badly on himself" or when Penny is "made to feel bad because [she] didn't get it the first time around." The "bad object" is more than the subject itself; rather it is mathematics embodied as the teacher – in both cases figures who are apt to persecute. In this way, the mathematics embodied as the bad object as a *figure of teaching* have the capacity to render Emily and her friend, struggling in the space together, so "upset" as to "feel stupid because [they] didn't understand it." Emily's use of the word "good," juxtaposes Sheldon against the figure of an imaginary, better teacher, as in when Sheldon is "not a good teacher" and then continues to explain why his answer for the best number, 73, "is a good number." Raj's suggestion of a number he "thinks is good" is not good enough, however. The use of "good" in this way fixes the idea that a "good" mathematics does exist somewhere but the term is used ambivalently. The other characters in the show don't *know* that 73 is the best number, according to Emily, as though this is a certainty.

Emily seems to have an ambivalent relationship with the good and bad objects in these three scenes. On the one hand, she condemns Penny for "just kind of want[ing] to sit and have [Sheldon] tell her what everything was" but then admits to identifying with Penny in some learning situations. Emily assures us that she is willing to work, like Howard, but then when she does, everything doesn't come together when she has tried to learn, she feels a "jolt" – a kind of visceral realization that she cannot possess the

mathematics after all because she lacks something fundamental: “you feel you weren’t smart enough to understand it.” The ambivalence results in the “good enough” object-relations dynamic with the show wherein the bad object (Sheldon) and the good object (Penny) are simultaneous identifications for Emily. Mathematics is both something she can use to defend against the world as in her competence with mental math we read about in the past chapters, but then is something against which she defends in the intersubjective space of learning in the classroom with another student where she “takes it personally” that she didn’t understand, maybe on account receiving instruction that amounts to a delivery of content without explanation. In her frustration with formulas not being derived so she can get the “whole understanding,” she condemns Sheldon (and hence mathematical knowing itself) as something not everyone is going to “understand just by telling someone else.”

I am caught in this dynamic as both a viewer and as a teacher as well. I resist the concept of “good enough” as a teacher, even though I know it unfolds in my pedagogy every day. After all, I teach six periods per day and I prepare each class with heart and vision, but some days, my teaching feels like it amounts to being “good enough” but that is all. I know that at the end of some of my lessons, there are students who don’t “get it” or don’t understand anything and sometimes these students get lost in the life between bells and classes and days and I never return to them. Perhaps my anxiety about being Sheldon is thus wrapped up in a desire to have his mathematical knowledge and my resistance towards his method of just “telling someone else” how to do it (to paraphrase Emily), even as I recognize this is what I do for a living. I take it personally as well, when my students don’t understand and I felt I have been clear – as in my opening

vignette about Courtney, the girl who couldn't divide, and whose scene of crying in the mathematics classroom disrupted the space.

The genius and the bimbo

For Jane, there is less ambivalence in her reading of the television show characters. She articulates a strong binary between the mathematical objects in the show, which she reads through their stereotypical characterizations. Throughout the interview section that follows, the good and bad objects are described using the words “bimbo” and the “genius” and she works to identify with and against both.

Jane: You do see the different learners as, like what I saw is a very kind of like **genius-like, know it all pretty much**. You know the more advanced learners who are extremely you know well off. Then almost like the average learner or a slower learner to a more advanced person. Yeah it's pretty much the differences that I saw, like you just like pretty much see like almost like the **bimbo and the genius pretty much**, that's what...

Intvr: So, do you think that the show like works on that premise maybe like there has to be like that separation?

Jane: I don't think it is not necessary I don't think it really is. The show definitely is probably most popular because of that, **it is portrayed as the bimbo and the geniuses pretty much. Or like the regular, you know average person's mentality like the genius**. I don't think there should be a distinction like that, I think there always will be that in society but...

Intvr: So, what do you think about the representations of what math means, like what does it mean when someone is like I'm doing math or...?

Jane: The show makes it seem really complicated, like these things that they, when you think of math and you see the show you are like, **oh my God, this something for geniuses**, it is some intense stuff. **But I mean math is really everything right?** I remember doing math, in high school and even in

college and it wasn't that intense. So, there is nothing, everything has just it doesn't have to be that intense as it is portrayed in the show.

Intvr: *When you were writing down your notes or viewing the clips, did you feel like you identified with any of the characters?*

Jane: Yeah I did, I felt like I identified more, towards Penny. I'm more of a slower learner, you kind of have to like take me step by step for everything. You can't really rush anything with me. **She is more a bit of a bimbo on the show so obviously not completely like her. But yeah probably the most with her. Everyone else seemed to be like really like some genius levels. So, I'm definitely not a mathematician.**

First of all, the naming does not necessarily follow the functions of these characters as opposites in object-relations theory. Both Sheldon and Penny are ascribed terms that characterize them as abject in some way: the bimbo (dumb) and the genius (nerd); however, it is interesting that the bad object has a term that is considered to be better than the good object, who has a gendered, devalued name. In this conflation of the good and bad objects, Jane likens the genius to the average person's mentality when she states, "the regular average person's mentality like the genius." So while not everyone can be as "intense" as Sheldon in their mathematical knowing, the bad object is more desirable in one way – one that average people should aspire to be. Jane's reading of the scene provides some clarity to me about my own ambivalent feelings about wanting to be like Sheldon. In desiring to be like the genius, Jane is clear that she doesn't want to be thought of as a "bimbo" and this is understandable as Penny's character is stereotypically the dumb blonde. This language of using the word bimbo is no doubt projected into Jane's reading of the show by being reactivated through other popular culture tropes of the same kind as blondes are made to be dumb in all sorts of popular culture artifacts. Transferring the stereotype into her reading of the scene and herself,

Jane is uncomfortably *forced* by the show to identify with Penny, which is troubling because she reads Sheldon as a stereotypical genius – perhaps what mathematicians might be like in real life. Reluctantly, she describes herself as a “slow learner” and therefore, she must be like Penny. Since “math is everything,” Jane’s analysis indicates that she wishes to be like Sheldon, but she cannot reach these “genius levels.”

Defending against the possibility of ever possessing the bad object entirely, she reinscribes the belief that mathematical knowing somehow selects the learner. Despite a subtle aspiration to possess the bad object (total mathematical knowing), since she has to be taken “step by step through everything,” this is an impossibility. Her denial that mathematics even has to be intense is a defence that enforces that perhaps total mathematical knowing is an impossibility for *anybody* except these fictionalized characters, and so she does not have to worry about it, as her high school and one year of college experience indicates. Regardless of aspiring to be Sheldon, and denying her status as bimbo, it is mathematics itself that becomes the fiction, not the characters.

Projection / Introjection

Debra takes a slightly different tack with relation to Sheldon as the bad object. She justifies Sheldon’s certainty that there is such a thing as the best number even as she simultaneously questions it. This leads to an interesting analysis:

Debra: Just to go back, and because it wasn’t very long, right. So I just re-watched it all, and there is, um I think it’s a factoring they are using. Like ‘cause he uses the example that the best number is 73 and 73 is a multiple of 7. No sorry, because he was timesing seven and three and whatever so that number equals 21. So and he said that that number was in relation to the 73?

Intvr: So how did you feel about Sheldon like saying it was the best number for example, or making that claim?

Debra: It's just like, anyone can really say any numbers is the best number. You know what I mean? Because, I don't, like he **gave like actual mathematics reasoning for it**. Which makes sense because other people will just be like, oh no this is the best number because like my birthday is.

Intvr: The 23rd for example, like mine is the 23rd.

Debra: In the 8th month of, yeah like stuff like that, you know what I mean? Like he gives the **actual mathematical reasoning to it which makes a lot more sense**.

Intvr: Do you think there is value added to that, or do you think it's up to the individual for example?

Debra: Well there is value, because like he just didn't pull random stuff out of his hat. You know what I mean? He used **mathematical reasoning** for saying that 73 is the best number. Yeah, I don't know how to explain, I am not very good at explaining.

Intvr: No, it's perfect, this is perfect and this is exactly what I am trying to get underneath. It sounds like what you are saying is because he has actual mathematical reasons for his choice that somehow makes it a good choice.

Debra: Yeah, I find it does. Because other people don't have, like they have reasons too, but like, I don't know. Some people could say they are born on, January 1st of 2001. And they say the best number is one, because of those reasons. But they are not actual. Like I find it, **it's cool to hear that, the best number is a number that can be mathematically driven** you know what I mean?

What is captivating here is that Debra, though she questions Sheldon, justifies his assertions. Even as Sheldon stands in as the bad object in other readings, here we see his embodiment as mathematical knowing undergoing *splitting*. For Debra, Sheldon might not stand in wholly as the bad object. In Kleinian object-relations theory, there is projection and introjection at play when thinking of the same object (in this case, mathematical knowledge). And it serves us well to consider Debra's reading of Sheldon

as not wholly good or bad. The baby in Klein's analysis has a bad mother on account of moments of not feeling totally comforted, and projects this bad feeling onto the mother; and the baby also has feelings of goodness when being fed for example, and introjects so to "feel himself to be 'good'" (Waddell, 2002, p. 254). This splitting is part of separating the good object from the bad object that characterizes the classic paranoid-schizoid position. Debra glosses over Sheldon's personality quirks up front to get at the splitting that occurs when considering the object that is *mathematical knowing*.

Debra works hard to understand the mathematics and rehearse it back to me in the interview (the justification for the best number being 73). Interestingly, as even as she begins to dismiss the idea of there being a best number at all, she returns to the core principles of "good mathematics": mathematical reasoning. First showing her mathematical reasoning by explaining Sheldon's rationale back to me, Debra relies on this language from the Quebec Curriculum which determined her grade and future in more than a trivial way. In Quebec, there are two grades that make up all mathematics marks in the province from Kindergarten to Grade 11. There is Competency 1 (Solves a Situational Problem – which is a large real life scenario that brings together all previously learned material and is a single large question); and Competency 2 (Uses Mathematical Reasoning – which are the multiple choice, short answer, and long response questions that conventionally make up traditional testing). The Competencies are weighted 30% for Competency 1 and 70% for Competency 2. Perhaps through a lifetime of emphasizing the important weighting of mathematical reasoning, Debra, feeling success with mathematics throughout her life, begins to rely on the certainty of mathematical reasoning as part of "good mathematics" – a manic introjection that she

can manifest, even as she pauses to reassure us that “she is not very good at explaining.”

We continued our dialogue to reveal more:

Debra: About Penny, I am just surprised with Penny [giggles]. She is actually, I kind of ... because the Physics thing is. Yeah, well I guess it’s not going too good right now.

Intvr: *Oh no.*

Debra: But I can kind of understand her there. Because I am reading my Physics book and I just want to fall asleep. [Laughter] **All it is, is reading and I am like, oh my God. Because there is no teacher there helping me right or giving me any examples and whatever.** I am just reading all the time, and...

Intvr: *It doesn’t really bring it to life?*

Debra: Yeah, for sure. And I feel so bad for her because she just wants to learn what Leonard does. And she is **getting the whole just of it and I am like, oh my God, like she just want to know one little detail about something and Sheldon has to give it all to her.**

Intvr: *So when you were like jotting the stuff down. Did you feel like you identified with any of this characters?*

Debra: Yes, mainly Penny. Because I guess I’m, for some stuff I am not, how do you say that like I am not educated in it? Like she isn’t, like she doesn’t know what’s there or talking about right?

So she feels bad, because she is not as smart as them. So basically when I hear other people like when we were in high school and we just came out of the exam, everyone was kind of like rush to everybody else and say, **“What did you get for this answer, what did you get for this answer?” And my answer will always be different. Like okay, I guess that’s alright and I will just fail and do it again next year I guess.**

Intvr: *So I guess one of my last questions for you, for this whole thing, would be does the show remind you of any specific memories from Math 10 CST? Or if not, like that’s fine, but I just I wasn’t sure if there was anything that might connect the two in your mind.*

Debra: I guess sometimes. I can’t remember what specific things or fractions, yeah when we had to so, using fractions within equations and stuff I kind of felt like Penny. Looking at you, up on the chalk board like what, like “what are

you talking about?”... that kind of thing. Like when she just stopped and stared at Sheldon with that face on her. [Laughter] **I felt like that, I felt like oh well I better like close my mouth, I will be catching flies or something.**

In Debra’s repetitions in this section, she uses the phrase “oh my God” twice which highlights her heightened emotional response to the overwhelming parts of physics. This part of the dialogue brings us back to “bad mathematics” – as that which forces Debra to the feeling of being overwhelmed by the object itself. Without a teacher to explain it and reduce it, Debra like Penny, is overtaken by the concepts and calculations. In the post-examination rush to determine who possesses the right and wrong answers, this leads to feelings of resignation, whereby Debra feels she will just fail without even knowing her result yet. She laughs through this section, identifying with Penny’s inability to parse the numbers without explanation, humorously relating herself to the image of Penny’s stunned face against her own, where she’d be “catching flies” if she didn’t close her mouth. Reading this section against the earlier one, it is again clear that without an aspect of mathematical reasoning *in the instruction* of mathematics, one is left stunned. Reading this section alongside Debra’s generally positive experience of learning mathematics and using it in everyday life (as in Chapters 6 and 7), bad mathematics only *becomes* bad on account of its poor or absent delivery.

Reading the analytic moment

Here I would like to summarize the analytic moment as my participants and I read ourselves with and against *The Big Bang Theory*. Having taken object-relations as a

mode of analysis to complement the Screenplay Pedagogy methodology, what became apparent was that for most participants, Sheldon was symbolized as the bad object representing total mathematical knowing and Penny was his opposite, as someone who needs help or lacks desire to know mathematics. There is a clear affective response with attachments or rejections of the text that can be summarized as follows.

The bad object (Sheldon) is only rejected on account of his symbolization of impossible mathematical knowing that is considered *fictional*. The mathematics he represents exists as a fantasy of the subject, not its actual “life” as something to be done by everyday people. Furthermore, the failing of the bad object rests in its *pedagogy*. Just as Sheldon is bad on account of his poor pedagogy with Penny, mathematical knowing is only bad if it reflects badly on the learning (intersubjective) space. Mathematical knowing is something to be rejected if it means making the subject (learners) *feel bad* along the way.

Conversely, the bad mathematical object (Sheldon) can be redeemed through good pedagogy. If the subject is broken down into manageable chunks, then it becomes less bad and more consumable. Mathematical knowing needs to be something one can possess. Thus learning is meaningful if it is not just something one acquires, but that one can also represent/sell back to others (Appelbaum, 2008b). Interestingly, Penny is both rejected and accepted as the good object. She is the good object, generally, for her approachability and learning style, where she needs it broken down. She also stands-in for what participants see as the average learner – someone who needs it taught properly and slowly. She is less good because of the way the show stereotypes her as either a

bimbo or unwilling to put the effort into learning, although results are mixed here as some participants felt she was really willing to try (a redemptive reading).

As well, mathematical knowing is tied up with “intensity” because Sheldon is unrelenting in his knowledge. His symbolization of total mathematical knowing remained intact even for one participant whose response could be read through the concept of splitting. He displays faultless “mathematical reasoning” even though his personality is abject which, once again, is an effect of poor pedagogy. However, the embodiment of the bad and good mathematical objects was sometimes ambivalent (as in Debra’s and my reading of good and bad aspects *of* the bad object) but the necessity of mathematics is not. Mathematics itself was not rejected; it was read as necessary, as essential to everyday life. Participants had different ways of articulating this perceived reality – as in when characters might not like it but they “have to take it” (Emily), that “mathematics is everything” (Jane), or that in the face of failure, one doesn’t give up but “just do it again next year” (Debra). Mathematical knowing is accepted as fact, and hence the bad object is internalized, and once again only rejected on account of poor teaching.

Chapter 8: The synthetical moment
Implications for future mathematics teaching

If media fictions are part and parcel of the living of life in the present, these need to be explored as one aspect in which the fictions and fantasies of the subject are constituted through, or in relation to, the regimes of deeply interdiscursive meaning through which subjects understand themselves and others.

(Blackman and Walkerdine, 2001, p. 96)

Bringing it together

In the synthetical stage of *currere*, “one enters the circumstance typifying the present (Pinar, 2010) and asks whether the other stages carried out “point toward increased conceptual sophistication and refinement, to deeper knowledge and understanding” (Pinar, 1975b). This final chapter of the dissertation is a reflection about the data collection and analysis contained in the previous chapters that answered, in part, the research questions underpinning this study. The research questions that were addressed with each of the previous *currere* chapters are as follows:

- 1) By reading former students’ defences in the stories they tell about teaching and learning mathematics in the Grade 10 classroom in Quebec, what psychic conflicts are revealed?
- 2) Through *currere*, what do we learn about how mathematics shapes individual subjectivities beyond the classroom?
- 3) How can a *currere* pedagogy be used to understand mathematical identities in teaching and learning?

At this juncture I would like to examine what emerged from reading the responses in the previous chapters that attended to each of these questions, and to synthesize the final question in the sections that follow here. In searching for deeper understanding of

mathematical learning in the Quebec Anglophone context, this thesis has been a task of attempting to understand researcher and participant subjectivities. In so doing, the research has been structured through a *currere* journey that enabled us to understand the defences that structure psychic conflicts about classroom learning, visions of the self in the present outside of the classroom, and how individuals who are the product of structured pedagogies and testing of the Quebec curriculum come up against the discursive structuring of a popular culture artifact to read themselves in the present, the past, and the future. Vis-à-vis Screenplay Pedagogy, the reading of responses gives us a glimpse into the subjectivities entwined in the world of CST mathematics in Quebec. However, in order to fully understand the responses in the synthetical moment that follows, my own *currere* journey needs elaboration. If I am to answer the question of the significance of this study, I need to understand what it meant to be a student in *my* mathematics classroom and this begins with my journey towards this project as a teacher.

Revisiting a *currere* journey

Though it was a long time ago, I remember a conversation that I had with a professor of teacher education about what inspired her research. I was a B.Ed student at the time, specializing in intermediate/senior chemistry and biology, and I was pondering doing a Master of Arts in Education to further my educational journey. The conversation took place in the Learning Resource Centre of the University of Ottawa, Faculty of Education. As the professor described how researching the unconscious dynamics of learning was important to her understanding of the conflicts within education, I felt

myself getting anxious. I recall (as she does) a moment where I blurted out that this was all junk. I was interested in the mastery of the concepts. I'd already taught for two years before getting to the B.Ed (on a *Tolerance d'Engagement* certificate in Quebec, reserved for non-qualified teachers filling a need for people to instruct in underserved parts of the province). And I had great results. I felt that the B.Ed was a formality and I was doing just fine rehearsing my knowledge, honing in on new techniques, developing a repertoire for dealing with students with diverse learning needs, all the while working on being empathetic in the classroom. What did one want with the unconscious? How would that help my pedagogy in everyday practice with *real* kids who needed to learn mathematics and science? In the years since that conversation, which has stuck with me as a moment of feeling profoundly embarrassed as I denied the relevance of someone's research whom I admired, I recall how adamant I was. How I refused to look to the past of my own learning and my own conflicts in making me as a teacher.

Reading now the vignettes I have put forth in this dissertation, the small stories from the teacher journal I began to keep (one I felt compelled to start but I didn't know why), I think through my own learning past. As a student competent in all subjects except physical education (a site of major anxiety and fear), I felt that the real learning at the dinner table with my middle-class, university educated family was the epitome of how education should be done. One learns at school and reinforces concepts at home. I learned the facts, the history, the literature, the equations, to know them, perhaps to ingest them right there alongside my dinner. In doing so, I felt whole, armed to take on the world and its challenges. I was not always successful, though. I couldn't learn everything easily in my science degree, almost failing second-year biochemistry and

barely scraping by in physics (ironically). Placing the blame squarely on myself, I was baffled about the basis for not being able to move ahead in my chosen field. So I gave up after I finished my BSc. Having always loved analysing literature, perhaps it was my “real love” after all, I embarked on my first Master’s degree experience in English. The problem with having a love like literature is that, prior to embarking on the risky journey of abandoning my science education, I never associated learning with desire. All I had to carry me forth was the gratification that came from doing things well. I was primed to do the sciences. First born, relatively gifted, I lived a life destined for medical school. I worked very hard to be the good-enough daughter. (My god, what an old cliché story this is!). I had to let go of *the concept* of being the master of a subject I wasn’t really a master at all, nor did I care about very much.

In terms of my teaching life, this journey through educational research, beginning with that B.Ed in 2009 until now, has brought me to a realization that there is more to the emotional life of teaching mathematics than being the master – clear, competent, caring in the classroom. The gratification that comes from being those things is selfish and it is not good enough. The students are nowhere in that picture. Ironically, as I let go of my previous notions of what my career ought to be, I clung to the very same pedagogies that informed my own schooling as a child – about what “real” learning ought to be in terms of internalizing the concepts and knowing them well and I rehearsed these with ease and confidence to my students. I told them how important all of this material would be one day, and I worked hard to make it clear for them. However, reading the stories of my former students as they describe their lives in relation to mathematics in my classroom is jarring. The stories were there all along and

I didn't see them, and their stories change my vision of what is going on inside the mathematics classroom entirely.

On not being a mathematician

One question that haunts this research is about what defines being a mathematician and perhaps why I do not see myself as one. In the above section, I recall feelings of being an impostor, a phenomenon popularized in the media as a syndrome (Buckland, 2017; Stahl, 2017). Though I am a mathematics teacher, I do not have a degree in pure mathematics. This sits with me as a failing, as a form of “real and specific form of intellectual self doubt” (Stahl, 2017, n.p.). What are the implications for me as a teacher and researcher of this distinction between the figure of the mathematics teacher and that of a true mathematician? I am reminded of what Winnicott (1960) describes in a defence entitled the “false self:”

"(i)n the first case the mother's adaptation is good enough... (i)n the second case... the mother's adaptation... is... not good enough. The process that leads to the capacity for symbol-usage does not get started (or else it becomes broken up, with a corresponding withdrawal on the part of the infant from advantages gained)... in practice the infant lives, but lives falsely. The protest against being forced into a false existence can be detected from the earliest stages. (1960, p. 146).

Winnicott goes on to explain how those who operate under the false self might feel inadequate or predicate their relationships on an outward show of pretense. I worry

about this as a teacher; however, I am reassured by the idea that a false self is necessary in some professions. Social order is maintained through the interaction of false selves in demanding professions such as medicine, policing, and the military, where we might not want individuals showing their true selves. Winnicott (1960) further explains that “(i)n health: the False Self is represented by the whole organization of the polite and mannered social attitude...” and “the False Self defends the True Self...” (p. 143); though “...the False Self, however well set up, lacks something...” (p. 152). In my teaching world, the defence against not being a real mathematician might be located in the early unconscious, whereby being rewarded for (and subsequent expectations of) high achievement were counterindicative to the individuation process from the mother. The mother in my case was the literal and figurative expert in all that I was doing – a schoolteacher and historian with graduate degrees. As I progressed through childhood into university, guilt, fear, and stress marked the methods by which I achieved academic success, with one building on the other. To read this strongly, the failure of the infant to fully engage with its primary narcissism – and thereby develop an autonomous self separated from the mother – can be marked by an ongoing dependency upon external measures of validation. No doubt, as I look at my projection of the false self onto my classroom, the well packaged teacher, rehearsed and knowledgeable in mathematics, it is still irreconcilable to me that I might truly be a mathematician unless I prove my mettle through external standards (such as the acquisition of university degrees in pure mathematics). What does this mean for teaching? No doubt, in the transference dynamic, I project an assuredness in the content that I teach but with reservation that I am *doing a job*, one that requires certain mathematical knowledge. It is not an identity statement whereby I *am* a mathematician and the true and false self seamlessly flow

together (perhaps thus erasing the false self in regards to mathematics). The countertransferential dynamic that returns from students who feel that the pedagogy fails them in some instances strikes me as a crisis because of this, one that I have discussed at length in this dissertation. I might offer that the crisis is a threat to that which I feel *does* reside in the true self – the expertise in teaching. I am more willing to concede the inability to do an advanced mathematics problem because it is external to who I am as a person, than to concede failure as a teacher whose identity is wrapped up in the conveying of the knowledge that it is my duty to teach.

“Running the (mathematics) course”

I return here to my sad inspiration that framed this study from the beginning. When Courtney couldn't divide, I felt anger and confusion, even hatred towards her. And she clearly felt threatened by the performance of doing mathematics for all to see. The questions framing this research study aimed at uncovering what was going on in this moment and many other moments missed and captured in my past teaching. I suspect now that there was deep psychic conflict between us, and as I suspected, between other students and me. So what does this study contribute and what is its overall value to the literature in education?

While there are many studies dedicated to understanding mathematics anxiety, few use *currere* to do so. Furthermore, the process of *currere* in this study was layered. It was a *currere* pedagogy that explicated a line of questioning in the interview setting that became students doing *currere* themselves. As well, the dissertation is organized as

a *currere* pedagogy itself. There are scholars that use psychoanalysis to understand the conflicts held by people involved in the scene of teaching and learning mathematics, and some take up how mathematics is represented in popular culture and cultural studies. They do seek to understand both the representations and the ways students or teachers might respond to popular images or constructions. *Currere*, in this study, is a framework in relation to this. This work outlines a way of understanding popular culture as a relational object the former students can work through, and then I sought to work through their anxieties. In addition, I am making sense of the participant responses in relation to my own pedagogy. This is different than the literature I have reviewed in the sense that I am bringing mathematics, *currere*, and psychoanalysis together. But what value does this have and what has it enabled me to do? The answer to this is that by juxtaposing the work of those working from various narrative standpoints, alongside the narratives of my students and me, a different kind of synthesis is possible. The juxtaposition opens up the ways that *currere* is a methodology that makes available the rhetorical analysis pursued using a psychoanalytic stylistic. By using *currere* to unpack the narratives and open up spaces of free association, reading the repetitions of language for both manic and phobic defences was possible.

Here I would like to return to a few facets of the literature review to further explain the value of juxtaposing intellectual traditions. Earlier, I refer to Doerr's (2004) important work about having individuals report their stories because they can "make something" of their experiences. And Kincheloe (1993) stresses that participants, particularly teenagers, need to develop intrapersonal understandings about themselves at critical times and developmental times. In that sense, grounding the work in *currere*

asked the questions of how we are all knowers of our worlds as they unfold in the classroom and beyond. In this research, the role of memory became important in the free associative dynamic (Casemore, 2010) because the conflicts and uncertainties felt by my former students unconsciously were made visible to me as both teacher and researcher when I asked questions about students' learning. I was brought to the scene of intersubjectivity thinking that the interviews would reveal a dynamic interplay where students would feel deeply connected to the learning and to my instruction. The intersubjective space where *implicit relational knowing* takes place might have been the location where dyads of teaching and learning (teacher and student) might be totally absorbed in the immediate moment – the present intersubjective relationship of teaching and learning. However, this was not so. My former students' statements about feeling disconnected and their sense that they were just told to “do” the mathematics instead of learn it completely, or alternately where they had success, it was a matter of feeling as though they possessed the mathematics *not* because I engaged with their individual identities as learners. My way of viewing students in a Cartesian fashion – as indivisible selves/subjects with a restricted amount of autonomy in the learning space negated the ways that multiple learning selves are evident in the mathematics classroom, tied up and anchored in various interactional moments.

Looking at mathematics inside and outside the classroom, this work furthers the research of Mendick and Moreau (2014) who describe *both* positive and negative comparisons students make when telling their stories about how they see themselves in relation to popular mathematical discourses. While much of the literature that informs this study relies on negative experiences of mathematics, this study employed Nimier's

(1993) typology to complement Mendick and Moreau's (2014) use of stories to uncover dynamics that traverse the emotional spectrum. However, what is equally interesting here is that the former students in this study did not merely identify ways that mathematics might be positive in hypothetical terms (as in game shows or banking) but were able to articulate facets of *their* mathematical identities in everyday ways. They were quick to point out how mathematics is integral to their daily lives despite some negative experiences in teaching and learning. They recognized and reinforced their abilities and even enjoyment of mathematics both within *and* outside societal definitions of what constitutes mathematical competence. Just as students were quick to critique the characterizations in *The Big Bang Theory* as pointing towards stereotypes to which they do not conform, they were also quick to ascertain that despite being in CST (or "low") mathematics, they were perfectly fine calculating tips, taxes, and so forth.

So what do these articulations about competence mean for both teacher and student? In other words, to return to a question emerging earlier in the literature, how might we engage with educational socialization as a psychic process? Intersubjectivity in the classroom, through its moments of meeting, needs to capture the kind of dynamics going on in the interactive unconscious and conscious exchanges between teacher and student. Teachers, even competent ones, are at risk of losing sight of the fact that each classroom moment is an intersubjective learning event that gives rise to something completely new, that transcends the transactional interactions that go on in the delivery of mathematical concepts themselves. No doubt, participants had strong feelings about the ways educational ideologies "hail" them (Althusser, 1969/1971). I would assert that through the *currere* process, they were able to first *feel* the tensionality between the

concept of self and the context of the social. And the *currere* questioning provided the template for participants to examine their formation as subjects within the regimes of schooling and of mathematical computations. The mathematical discourses of competence and ability are those which “recruit subjects” (Woodward, 1997) and students in classrooms everywhere no doubt read themselves with and against these. However, in weaving a psychoanalytic stylistic into the questioning via *currere* whereby participants were able to render their complex subjectivities within the worlds of both love and hate (Bibby, 2011), they were able to give more structure to their subjectivities. In other words, as Brown, Hardy, and Wilson (1993) emphasize via a Lacanian reading, our unconscious is created on account of our emergence into language, and so new mathematical identities are shaped and reshaped reflexively *on account* of storying the self. The subject’s position in relation to both learning and larger societal discourses about mathematics is ever-shifting and malleable – an empowering position for the participants who can continue to refine their mathematical identities. Additionally, for Brown, Hardy, and Wilson (1993), mathematicians rely on the binary of right/wrong answers as ways of knowing the world, and the Desire that is structured by lack is satisfied through questions that can be answered fully and totally. The participants in this study came to know the world by arguing against the necessity of these calculations as the structuring dynamic of their identities. Pushing this further, to use Bibby’s (2011) phrase describing “extreme states of certitude,” we can recognize when something is being defended against when one asserts that one knows nothing or, conversely, that one knows everything. In this study, the participants show us that knowing nothing or everything – these polar states – do not shape their subjectivities and are not the basis for their defences within the framework of Nimier’s (1993) typology. Rather, what is

defended against is the *teacher's* omnipotence or the all-knowingness of pedagogical strategies that are left unquestioned whether they are effective or not.

In further reading participant responses, the transferential/countertransferential dynamics existed on two-tiers in this study. Mathematical operations sat at the centre of the “subject who knows” but this was only the first tier. The second is that the teacher who is the embodiment of “that is supposed to know” (Lacan, 1979) – the image of omnipotent knowing against which I still measure myself -- was sought after by the former students who often felt the teacher to be absent or missing. In the reading of *The Big Bang Theory*, participants’ analyses reinscribed this by articulating time and time again that it was not Sheldon’s mathematical knowing that was in question, but rather his pedagogy that failed. Similarly, in the moments of transference and countertransference, my lack of willingness to participate in the process of “knowing thyself,” even when it meant being comfortable with uncertainty, halted the learning process when mathematics ceased to be a co-created experience. I failed to take into account my own learning and history, falling into what Britzman (2009) describes in teacher education that applies in high school classrooms too, “its own demand for order and compliance” (p. 21). Mendick (2006), who characterizes the split subjects and the binary of knowing/not knowing as being “not able to bear to know” (p. 133) rings true here for students and teachers alike. However, rather than a desire not to know mathematics which characterizes the subject through refusals of knowledge for the self, my participants once again refuse the tropes presented to them that define what competence looks like. Rather than subscribe to the stereotypes in the show, or the presence of the teacher as omnipotent and all knowing, the students problematize

Sheldon's certitude, my certitude, and Penny's ignorance. Looking outward rather than inward, the participants emphasize that "siding" with Penny as socially normal does not excuse her incompetence for them. They recognize the signs of refusal, and as seen in the regressive and progressive stages of *currere*, all of the participants actually seem to have a relatively healthy mathematical identities outside of the classroom. They all feel they can do mathematics given the right context, instruction, motivation, and relationship. Looking at my vignettes, the extreme states of certitude that characterize my anxiety around performing in the classroom – these internal fantasized versions of the self – are in large part what students defend against. Thus, to build upon the literature which writes participant mathematical subjectivities as an interiorized conflict of the self against the tropes of mathematics in society, my participants actually indicated that they are capable of reading the self against these tropes that seek to define them as lesser learners (by virtue of taking a lower class or because they might have struggled to get good marks). Even though not all participants were able to control the symbols (of mathematics) or their symbolization (vis-à-vis societal stereotypes), they were able to read themselves within a plethora of discourses. Embedded within these discourses were the extremes that Britzman (1998) reminds us characterize learning – the love and the hate – that shape the participants' and my stories equally.

As I stated before, the stories were always there, in the scene of teaching and learning mathematics. What this study contributes is recognizing that the intersubjective enactment that constitutes living and being in the mathematical classroom only happens when the unclear and sometimes mixed-up conflicts might be understood more fully as part of a larger cultural, social and familial picture. In order to address what Britzman

articulates about education as being about the “unknown and the inchoate,” can teachers like me understand that mathematics is not merely about how the equations are deployed? Rather, mathematics teachers like me are only able to begin being part of an intersubjective space of *implicit relational knowing* where our affective encounters might be then analysed through *currere* for meaning as it relates to how learning mathematics for students might also be threats to the psyche. Lewkowich (2013), in his study about pre-service teachers’ reading of stories alongside students, puts it this way in terms of what needs to be done in Bachelor of Education programs:

In the context of teacher education, to facilitate a space in which preservice teachers can safely explore the—at times contradictory, unofficial and illicit—emotions associated with their emergent occupational identities, and their own unfinished adolescence, might also provide an interpretive space for readers and teachers to approach their own limits and structures of acceptability, identity and thought. Therefore, such a space might allow teachers to explore “what one cannot bear to know” (Britzman, 1995, p. 165), and through such exploration, to develop a method for thinking about teaching potentially apart from the imperatives of preexisting structures and constraints. (p. 271)

Looking to the future, in the same way that Lewkowich (2013) aspires to have candidates understand the emotions tied to their newly formed identities as English teachers, I might suggest that the same backwards and forwards work of reading the self, reading mathematics teaching might be formative for new mathematics teachers. The artifact, not literature but mathematics, is entirely different, but it is possible to use the lens of psychoanalytic theory to better understand mathematics’ teachers’ stories

rhetorically as part of their formation of mathematical identities alongside those of their students.

Even though *currere* has not been used to study the “imperatives of pre-existing structures and constraints” for mathematics education before, psychoanalysis allowed me to understand how former high school students locate their identities across tropes of what it means to be a “mathematician” inside and outside of the classroom. Particularly telling was the general prevalence of phobic defences *inside* the classroom where participants felt “made” by the space that I created – as average, unknowing, stupid, and where numbers became untrustworthy, magical, or nonsensical. This is disturbing because, as a teacher who knows mathematics well and strives to make it clear, I could not provide an empathetic or dialogic enough environment whereby students’ strivings to fill the lack that was “mathematical knowing” only served to reinscribe students’ positions as squarely inside the “low” mathematical classroom.

Moving away from the learning space, participants began to address the psychic conflicts that emerged from their relationship with mathematics without (and perhaps despite) me. As stated before, they use mathematics in everyday life, productively and even pleurably. This indicates that beyond the intersubjective space of the classroom, participants were able to co-create *new* intersubjective experiences with mathematical knowing in spite of their education. The actualization of unconscious conflicts from inside the classroom emerged as rejection of mathematics as necessarily difficult in real life (“math isn’t as hard as it has to be”) or mandatorily formulae, as in the participants who describe doing mental maths as they move into their adult futures quite easily when shopping, with paycheques, or in working with accounting software. Critically,

pedagogy inattentive to the conflicts inside the classroom becomes the driving force behind these reparative mechanisms. In other words, my failure to understand the stories behind students' mathematical lives was not just a missed opportunity to take stock of the defences taking place in learning, but in fact contributed to repressive and other phobic dynamics. When reading ourselves against popular culture – something that is always there in the background reinforcing the life of learning – we tended to harken back to a darker time of classroom learning in our collective rejection of the main protagonist, Sheldon, as the bad object. This reading has implications for how teachers are viewed by students and new teachers alike. To this day, in my own space, I am beginning to be aware of the ways I reinforce manic and particularly phobic defences about mathematics.

Looking toward the future: Contributions of this study

First, as outlined previously, this study offers a *currere* pedagogy where it is possible to understand the psychic conflicts in the mathematics classroom. By reading former students' recollections of past experiences using the typology of manic and phobic defences, we can come to understand how students feel about their futures as adults using mathematics outside the classroom, and their own analytic understanding of how societal discourses such as popular culture works back to shape their impressions of mathematics in the world. It is equally possible to learn how these become transformed or reinscribed as students move from the high school environment into the present use of mathematics. In looking ahead at future research projects, it would be both productive and revealing to work with students from different demographics. While this is not a

specifically sociocultural study whose focus was gender or ethnicity as main issues, nor did they emerge as strident themes, likely due to the homogenous nature of the community (all students were from a Caucasian background and all students in the school were white), a similar study in an urban school might reveal underlying questions about gender identity and/or ethnicity as factors related to representations of mathematics or mathematizing in schooling and society. A future study with high school students might involve them more directly undertaking the *currere* process throughout the course of a school year, journaling, working independently and together to share reflections about their past histories and future aspirations, and reading the self alongside public discourses of what it means to be mathematical.

The second contribution I noted in this study is how I began to understand that there is a failing in the way mathematics teacher education understands the intersubjective space with students. Far from it being enough to establish clear routines and delivery, and even cultivating an empathetic space, more attention needs to be paid to the stories that students bring into the classroom. In this study, I learned about the past lives of students and their feelings about mathematics as a subject long before they entered my space. As well, I learned about the different kinds of defences already at play in mathematical learning such as students who had repressive defences, or even reparative defences where mathematics is used to defend against other things such as fear of the unknown more generally. By learning about students' stories as they enter the classroom, future teachers might be able to better forge a dynamical intersubjective space that involves the co-creation of the teacher's and students' subjectivities rather

than simply revert to so-called “effective” methods of delivering the content tested through time and repetition.

Finally, this research can be applied across various demographics in Canada. As a methodology, the *currere* steps alongside the use of a popular culture artifact enabled participants this project to read themselves with and against both public and educational (classroom) tropes of mathematical knowing that otherwise defined them. This study offered a glimpse into the lives of former students of a rural school of approximately 380 students (Grades 7-11) in a town of approximately 1600 residents. Just as little research exists about the experiences and stories of Anglophone linguistic-minority students in rural Quebec, exists, there are other demographics within Canada that might need attention. How might immigrant or refugee students perceive their place in the classroom with their varying histories? What about indigenous students or marginalized youth? Just as we know very little about the mathematical experiences of students of this demographic, the research methodology of *currere* combined with Screenplay Pedagogy can be used to understand the defences that shape mathematical identities within the storied lives of so many more students in Canada.

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Appendix A: Recruitment Scripts

Phone Script: Hi, this is Tasha Ausman. I was a teacher at your school where you formerly took Grade 10 CST Mathematics. I am a PhD candidate at the University of Ottawa. I am recruiting participants to be in a study about their experiences learning mathematics in grade 10 in Quebec. I am looking for former students and/or graduates from the English school system in Quebec (Western Quebec School Board). Would you be interested in participating in my study?

If no: thank you for your time

If yes: Let me tell you more about the study. It involves answering some questions about your experience learning mathematics, and watching three television clips of *The Big Bang Theory* totalling 13 minutes in length (for all three combined). The entire study would take approximately one hour. It will involve a short personal meeting (on Skype or Facetime) and some written feedback about the television show via email or Facebook Messenger.

Can I answer any of your questions? If you are willing to participate, I will email or send via social media attachment (Facebook attachment) an Informed Consent form.

For more information or to sign up, please contact: Tasha Ausman, 103 des Scouts, Gatineau, J9J 1N6; tausm060@uottawa.ca, or 819-371-8834 (phone or text).

Email/Social Media Script: My name is Tasha Ausman and I am a teacher from a school board where you formerly took Grade 10 CST mathematics. I am also a PhD Candidate at the University of Ottawa. I am recruiting participants to be in a study about their experiences learning mathematics in Grade 10 in Quebec. I am asking you because you attended an English school in Western Quebec School board.

Let me tell you more about the study. It involves answering some questions about your experience learning mathematics, and watching three television clips of *The Big Bang Theory* totalling 13 minutes in length (for all three combined). The entire study would take approximately one hour. It will involve a short personal meeting (on Skype or Facetime) and some written feedback about the television show via email or Facebook Messenger.

If you are willing to participate, I will email or send via social media attachment (Facebook attachment) an Informed Consent form.

For more information or to sign up, please contact: Tasha Ausman, 103 des Scouts, Gatineau, J9J 1N6; tausm060@uottawa.ca, or 819-371-8834 (phone or text).

Appendix B: Informed Consent Letter



uOttawa

Université d'Ottawa
Faculté d'éducation

University of Ottawa
Faculty of Education

Appendix D: Consent form

Dear former student,

Research Project: Contested Subjectivities: Loving, Hating, and Learning Mathematics

I am Tasha Ausman. You might remember me as a teacher with Western Quebec School Board, either as a teacher at Pontiac High School (2010-2015) or Philemon Wright High School (2015- 2016). I am also a PhD student at the University of Ottawa. The objective of my research is to learn about individuals' relationships with mathematics, particularly those who have taken Mathematics 10 CST as it is a requirement to graduate in Quebec. This research will help schools and teachers in the future to understand better how students feel about learning mathematics and their relationships with the subject. I study under the direction of my supervisor, Dr. Nicholas Ng-A-Fook.

What will happen in the research?

All participants who wish to participate will be included in this research. Participants who have signed and returned the consent form will be interviewed over a one hour period. You will watch three clips from the show *The Big Bang Theory* to stimulate discussion. During our one hour session, I will ask you to do the following:

- 1) Sign in to Skype or Facetime for a preliminary interview of approximately 15 minutes. I will ask questions about your current work/education and in what year you took Grade 10 CST mathematics. I will also ask four questions about your experience of learning mathematics in the past.
- 2) I will send you links to three short clips from the show *The Big Bang Theory*. These clips are located on YouTube. The total viewing time is approximately 13 minutes. When viewing, I will ask you to jot down your feelings and responses to each of the clips.
- 3) I will then ask you a series of follow up questions that will take approximately 20 minutes. There are three follow up questions.
- 4) The Skype/Facetime portion of the interview will be audio recorded but not video recorded.
- 5) I will use the information gathered from our interviews to write my dissertation.

What will happen to the recordings and notes?

I will take all information back to the university. It will be kept for 10 years after the project has finished. I will only share the recordings with authorized researchers (i.e. my research supervisor and three committee members, all professors at the University of Ottawa). We will make sure that no-one else knows who is in the project. When we are finished with the information, it will be destroyed.

Tel/Tél : 613-562-5804
Fax/Téléc: 613-562-5144

145, Jean-Jacques
Lussier
Ottawa ON K1N
6N5 Canada

www.education.uOttawa.ca

What happens next?

If you agree to participate in this study, I ask that you answer the questions below and sign your name at the bottom of the form. Please note that taking part in this study is voluntary. Even if you agree now, you can change your mind at any time. Thank you for reading this information document.

Best regards,

Tasha Ausman

Consent form:

Audio Recording: I agree that Tasha Ausman can audio but not video record the interview questions, ensuring that participants are not identified personally in the study.	YES	NO
Documentation: I agree to allow Tasha Ausman to document the audio recordings of my answers to interview questions in written form for use in her dissertation work.		

I understand what will happen in the research project.

I understand that the recordings will only be shared with authorized researchers (i.e. my thesis supervisor and my three committee members) and that no one else will know who is in the project.

I know that my participation is voluntary and that I can change my mind at any time.

I know that if I decide to withdraw from the study, the data collected will be destroyed.

I am aware that there are two copies of this information and consent form, one of which I can keep.

I know that if I am not happy about anything that happens in the research project, I can contact the university at the address given on the next page of this letter.

Name of participant: _____ Date: _____

Signature of participant: _____

Researcher's signature: _____ Date: _____

Contact details for the research project: Contested Subjectivities: Loving, Hating, and Learning Mathematics

You can contact me, Tasha Ausman, in the following ways:

Write to:	Tasha Ausman 103 rue des Scouts Gatineau, Quebec, J9J 1N6
Email:	tausm060@uottawa.ca
Phone:	819-371-8834

You can contact my supervisor, Dr. Nicholas Ng-A-Fook, in the following ways:

Write to:	Nicholas Ng-A-Fook University of Ottawa Faculty of Education 145 Jean Jacques Lussier Pvt Ottawa, Ontario, K1N 6N5
Email:	nngafook@uottawa.ca
Phone:	613-562-5800 ext. 2239

If you have any questions about your rights as a participant or if you wish to talk to someone not connected to the project, you can use the following contact information:

Write to:	Protocol Officer of the Social Sciences and Humanities Research Ethics Board University of Ottawa <u>Tabaret Hall</u> 550 Cumberland St, Room 154 Ottawa, Ontario, K1N 6N5
Email:	ethics@uottawa.ca
Phone:	613-562-5387