Chapter 12
The Place of Problems in Problem Based Learning: A Case of Mathematics and Teacher Education

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Introduction

I [coauthor Fil] remember my first month of teaching well. I had just graduated from a problem based learning [PBL] cohort for my teacher education degree. My PBL cohort was structured around researching problems through teaching cases. Here is my first month of teaching, told as a teaching case:

> You are a beginning teacher in a small rural K-12 school in an isolated community in British Columbia. The school operates under a unique partnership arrangement between the First Nations Band and the local school district. Almost all of the 60 students are First Nations or of First Nations ancestry. A priority of the School District and the community is to incorporate local culture and language into school curriculum and pedagogies in order to better support the success of all students in the district.
>
> You are not originally from this community, but were drawn to this teaching position for the opportunity to live in this beautiful remote mountain valley, close to the land and surrounded by wilderness. Like many teachers throughout the province you had few opportunities as an elementary or secondary student to learn about Canadian Aboriginal history, culture and language. During your PBL teacher education program, at least one of your PBL cases focused on rural education and Indigenous education that gave you an opportunity to begin to research Indigenous content, pedagogies, and epistemologies. You understand this is a start but also know it is inadequate for you as a beginning teacher.
>
> You notice the effects of colonization, specifically the horrific legacy of residential schools on your students and their families. Your combined Grades 5/6/7 class of 17 students brings these scars with them to class everyday. Parents are distrusting of a school system that has historically done little to prepare their children for active life within the community or for further schooling outside the community. Although all parents are

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> interested in education for their children, many find it difficult to support schooling in its current form. As a result maintaining high school attendance is challenging for you and your colleagues.
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> After the first month of teaching you feel overwhelmed as you try to figure out how to teach a class that is the polar opposite of your practicum experience and far from your own personal experience as a student. You wonder how to teach the curriculum and integrate local culture and language in meaningful ways, as well as meet the emotional and social needs of your students. You look to the land for inspiration.

Fil's vignette or PBL teaching case provides the context for our chapter. Although written from his perspective as a beginning teacher, it draws upon issues, questions, and challenges similar to those discussed during his PBL teacher education program. As a teacher educator (Cynthia) and graduate, now teacher (Fil) of a PBL program, we examine what it means to learn about teaching through PBL pedagogy from both the teacher educator and preservice teacher perspectives.

Our experiences with PBL are in a specific post-baccalaureate teacher education degree program that is designed around PBL. Preservice teachers in this program encounter 11 teaching cases, similar to Fil's, and work in small tutor-lead groups to explore and research their questions related to the case issues. During a two-week cycle, preservice teachers work with curriculum specialists to learn more about the case through specific content areas and end the two-week cycle with presentations of their research to peers. Returning to Fil's teaching case that describes the context of his first month of teaching, we could explore the case with the following questions: How does PBL prepare preservice teachers to teach in contexts or places different from their personal and practicum experiences? What aspects of PBL for learning to teach can be used in the classroom for learning school subject matter such as math and science? How can land and place be inspirations for problem based learning and pedagogical inquiry?

In this chapter, we begin by introducing ourselves and our relationship to problem based learning. As teachers we focus on the importance and challenge of designing good PBL problems for our students and preservice teachers. Next, we examine the literature on place-conscious pedagogies and provide examples of case problems from our practices of teaching and learning through PBL. Finally, we conclude with ideas, thoughts, and challenges for designing problems for PBL that can have the potential to engage students, teachers, preservice teachers, and teacher educators in pedagogical and mathematical inquiry.

Importance of Place in Considering Tasks: Place as Problem and Possibility

I (coauthor Cynthia) grew up in a small mountain town in Kootenay territory of British Columbia. The town, nestled among mountain peaks and valleys of the Selkirk range, was, and still is, home to about 3000 people. Mountains frame the town, and together with surrounding glacier-fed streams, rivers, and lakes, they bound the area from the Interior Plateaus. The mountains were, and to some extent

still are, the community resource. They offer food (hunting and fishing) and economic (mining and smelting) and recreational (skiing, hiking, and snowshoeing) activities. Their massive presence humbles those who live within the mountain shadows. The spiritual beauty of this place extends from the land to the sky and includes a variety of weather systems. From towering vertical columns to wispy stretches across the horizon, clouds, thunder, and storms occupied that space in between the sky and mountain. For those who grew up in this place, the land and sky were intimately connected to personal experience.

Yet, the land and our experience of it were often left outside the classroom door. Although we lived amidst the Selkirk range, our Geography 12 class study of rock formations such as glacial carved peaks, mountain scree, and alluvial fans was grounded in a textbook. A glance out the classroom window would provide immediate experience with cumulus or cirrus clouds that feathered the mountain peaks, yet we kept our eyes on textbook diagrams of cloud descriptions. Memories and wisdom located in this land were not made available for school inquiry. Our studies were disconnected from the cultural, historical, and physical knowledge of this land and our own experiences of our local place.

Like Cynthia, I (Fil) am the product of an educational system fixated on keeping the real world away from the classroom. Outside, real-world problems were seen as too open ended and messy and tended to "interrupt" the flow of knowledge from the source (teacher) to the receptacle (student). I experienced this top-down, fact-centered approach in various schools as a student in both Europe and North America. Later, in an attempt to get closer to the "real world," and away from the regurgitation of facts, I chose to study physics and then, for the next 10 years, spend as much time as possible outside, exploring things that had been shut out of my classrooms. How could the beauty of the world, I wondered, be at once so obvious to children and yet so obscure to teachers?

When I began my teacher education program within the PBL cohort, I, like many of my classmates, knew little about the principles of learning and even less about elements of PBL pedagogy. Once I became familiar with these in a broad sense, I welcomed the apparent flexibility of the PBL model, as well as the emphasis on social and collaborative learning. Interestingly, though, I did not see a parallel between learning through PBL as a preservice teacher and learning to teach through PBL in my future school classrooms. That is, this connection was not explicitly addressed in my coursework or through our case investigations. In other words, we learned about teaching using a PBL approach; however, the specific elements of the pedagogy were not necessarily unpacked and deconstructed for use in our classroom practice. Interestingly, I did not consider opportunities – nor, to my knowledge, did any of my PBL cohort peers – to try teaching using a PBL approach during my practicum. In short, problem based learning was something that I left behind after graduating.

For many of us, school learning may have considered place as a problem that interfered with required learning and thus was ignored. How might place be a possibility for learning and teaching? Educators and researchers in the area of place-conscious education, advocate for place to be a central starting point for

education. Arguing for place-conscious education as a more holistic conceptualization of education, Smith and Sobel (2010) state it is not a new curriculum. Instead, it is "a way of thinking broadly about the school's integral relationship to the community and the local environment" (p. ix). It is a process, they write, that "begins with the local and that draws children into real-time participation in civic life and decision-making [which] can help children and youth begin to see themselves as actors and creators rather than observers and consumers" (p. viii).

Similarly, Gruenewald (2008) citing Clifford Geertz (1996) writes: "No one lives in the world in general" (p. 145). How then can the local be an inspiration for teaching and learning within a place called school? What kinds of tasks might help students learn to listen to the land and to ask with Gruenewald (2003) "What are our places telling us and teaching us about our possibilities?" (p. 639). Furthermore, what kinds of tasks might help teachers be open to an approach to teaching that takes place seriously and heightens awareness of place-conscious possibilities? In this chapter, we explore these questions from the perspective of teacher educator (Cynthia) and preservice teacher (now practicing teacher – Fil) in the context of problem based learning and pedagogical inquiry.

Nature of Tasks/Problems for Learning to Teach and for Teaching/Learning Mathematics

There are varied interpretations of what counts as worthwhile tasks for learning to teach and for teaching/learning in school math and science classrooms. Henningsen and Stein (1997) argue that high-level tasks have the potential for high cognitive demand by students. Good questions, on the other hand, are, according to Sullivan and Lilburn (2002), more than recall, educative and may have many possible acceptable solutions. From the perspective of addressing student diversity and differentiation, good questions are culturally responsive and related to students' interests and lives (Gutstein 2006; Gruenewald 2003) or provide students with pedagogical choice (Small 2009).

Worthwhile tasks are those that share characteristics of being inquiry or problem based. They can offer students some degree of choice and require self-direction and motivation for completion. As a beginning teacher, creating such tasks can be a challenge, especially if teachers have few opportunities as students themselves to experience learning mathematics or science in this way. How can teachers learn the practice of posing, creating, and adapting worthwhile problems?

Teacher Educator Perspective (Cynthia): Designing Place-Based Pedagogical Problems

As a mathematics teacher educator within a problem based learning (PBL) elementary teacher education cohort, I provide opportunities for preservice teachers to experience both mathematical and pedagogical inquiry. With the guidance of a

PBL tutor, preservice teachers discuss, frame, and research various issues, including the teaching and learning of mathematics, that they identify in a given written case. For example, one case featured an elementary teacher who agrees to try using math journals with her students but is skeptical of their value in developing her students' mathematical understanding, while another focused on a teacher wondering how to integrate the study of mathematical concepts across multiple subject areas.

As a mathematics teacher educator and mathematics education resource person for the PBL cohort, I provide resources for preservice teachers to respond to and inquire into their own questions. However, as many preservice teachers have had few experiences living mathematics through inquiry or problem-based approaches, I also devote class time for them to engage in mathematical inquiry. This then can provide a background for preservice teachers to collaboratively adapt, design, and explore their own mathematical tasks. As with Gadanidis and Namukasa (2009), these tasks provide opportunities for teachers to explore mathematics and to "disrupt and reorganize [their] views of what it means to do and learn mathematics" (p. 114). In addition, drawing upon Gruenewald (2003), the tasks described in the following section focus on challenging preservice teachers to consider teaching through inquiry using place-conscious education where an understanding of place is necessary to understanding "the nature of our relationship with each other and the world" (p. 622).

Pedagogical Inquiry Task 1: Social Justice Issues from Global to Local

> Between 1990 and 2005, Brazil cleared 42,329,000 hectares of forest – an area larger than Germany. The main cause of Brazil's deforestation is cattle ranching. Brazil is the biggest beef exporter in the world and has the largest cattle herd on the planet, 40 % of which is located within the Amazon basin. Land-use change and deforestation – which is mostly done fire – make up 75 % of Brazil's greenhouse gas emissions (Branbrook Design 2010, p. 34–35).

A number of cases within the problem based learning cohort include opportunities to discuss social justice and environmental issues. Although it may appear that mathematics likely doesn't play a role in such discussions, an understanding of mathematics is actually necessary to gain deeper insight into the issues and to consider possible actions to the problems. In our PBL mathematics education classes, we therefore explore various local and global issues with mathematical eyes. In one class we begin with the problem described above reporting information on deforestation in Brazil from *The Little Book of Shocking Global Facts* (Branbrook Design 2010). The reported facts provoke PBL preservice teachers to ask further questions: Has the rate of deforestation in Brazil increased or decreased since 2005? Which countries import Brazil's beef and how much is imported? What are the effects of such deforestation and how does this compare to logging practices in British Columbia?

Working in small groups, PBL preservice teachers explore other facts and consider how such information could be placed for mathematical investigations with their students:

- 848 million people in the world are malnourished. 1,600 million people in the world are overweight (Branbrook Design 2010, p. 65).
- There are over 15 million refugees worldwide, many living in long-term camps. The 1990 World Declaration on Education for All (UNESCO 2001) states that all children, including refugee children and youth, have the right to education. As of 2011 a large number (40 % of 181,533) of refugees in the Dadaab camp in Northeast Kenya are of school age (5–17 years of age), yet less than half are enrolled in school (UNHCR 2012, 2011).
- [There are] 6.8 billion people living on planet earth; 5.6 billion people living in less developed regions (Branbrook Design 2010, p. 76–77).

Some preservice teachers begin by engaging in the ethical and political issues of the problem and can be heard asking: Why are so many people worldwide displaced? Why is only half the number of children in the Dadaab refugee camp receiving education? How has Canada responded to the refugee situation? How many refugee children are in my school? Those preservice teachers, who focus on the numbers, do so to better understand the context. These preservice teachers tend to compare the information given with others that require research to find: What is the rate of population growth on the planet? How has the population increased? What percentage of people are living in less developed regions and what percent are living in more developed regions? Where are these regions in the world? Can we graph population growth for various countries?

When preservice teachers are engaged in both the context of the problem and the mathematics, they bring their passions and interests to teaching and learning mathematics. Although it is often challenging for preservice teachers to pose problems for their students that are also interesting and exciting problems for themselves (Bragg and Nicol 2008; Nicol and Bragg 2009), problems located in social justice issues often peak preservice teachers' interests. In the PBL mathematics education class, they are asked to start with an interesting global fact, consider other questions inspired by the fact, and develop a mathematics problem for students using the facts as inspiration. Preservice teachers work in small groups to design a problem and share their problems with the whole class. One class decided to follow up on a small group's presentation on disposable diapers, and this problem spurred questions and activities for two classes:

> It is estimated that 90 % of babies in North America use disposable diapers. In Canada there are 1,877,095 children under the age of 4 (Canada Census 2011) how many diapers are disposed in Canadian landfills each year?

The class, in this case, estimated that 938,547 [half of 1,877,095] children in Canada were under the age of 2 and assumed that by the age of 2 many children were toilet trained. Assuming that 90 % of babies in Canada use disposable diapers,

their calculation represented about 844,692 children. They estimated that for a child under the age of 2, an average of 42 diapers is used in a week. This leads to: 42 diapers/week x 52 weeks/year x 844,692 children or about 1,800,000,000 [1.8 billion] diapers per year. One teacher candidate asked:

> "But how large is that? That's a large number but, really, how big is it?"

The class continued and was encouraged to find a way of making this large number understandable and related to students' experiences. Understanding large numbers can be a challenge for children and adults. "How many swimming pools or soccer fields would 1.8 billion disposable diapers fill?" Ten? One hundred? Five hundred? Estimates indicated that preservice teachers themselves struggled with making sense of this large number. One group quickly searched online to find that an Olympic-size swimming pool has a volume of about 2500 m^3, and, working in their small groups, teacher candidates found that the number of disposable diapers disposed of in landfills in 1 year across Canada could fill about 720 swimming pools. For some teacher candidates, this number was still difficult to conceptualize, so they worked to determine the amount of land needed to spread the diapers out one-layer thick. Would this area cover the Vancouver landfill at Burns Bog? If the layer was a meter thick, how much area would be covered? How many soccer fields would it cover?

This task was mathematically challenging for many PBL preservice teachers but it also surprised them:

> My most memorable aspect of the course was math for social justice. I hadn't thought about using social justice issues to teach math [before this course]. I'm so excited to try this in my practicum class.

Tasks focused on global issues can lead teacher candidates to develop problems focused on local issues. The task of exploring these issues from a mathematical perspective provided opportunities for preservice teachers to experience learning mathematics through problem solving. Opportunities for PBL preservice teachers to design mathematical problems for their students around social issues engaged them in pedagogical inquiry that was located in places and issues important to them. As a result, preservice teachers sought to explore contexts and strategies for making mathematical content meaningful and engaging to their students. For example, some stated interest in designing lessons for their students focused on:

- Surveying recycling practices and dispositions of school and community members
- Studying streams near the school for their water quality and graphing the results
- Understanding and responding to the degree of homelessness around the school community area
- Developing culturally responsive lessons that connected students to the land and First Nations Peoples of the land

Pedagogical Inquiry Task 2: Historical, Graphical, and Mathematical Studies of Land through Geocaching

> Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens.
> (Sobel 2004, p. 7)

A second mathematical and pedagogical task elaborated in the PBL case materials focuses on using mathematics to better understand the places and land in which PBL preservice teachers will be teaching. This task involves historical, graphical, and mathematical studies of place.

There are multiple ways of learning about place that include: (1) talking to elders and community members, (2) learning stories of place, (3) learning the issues and concerns of community members, (4) learning the language of place, and (5) being a community member. Listening to place can be at the center of efforts to develop meaningful experiences for students learning mathematics (Cajete 1994). One way to learn more about place and mathematics is through the context of a worldwide hide and seek activity commonly referred to as geocaching.

Geocaching involves use of a global positioning system (GPS) device to hide or find various caches stashed in places around the world. A geocacher can hide a cache, use the GPS to determine its location, share the location online with others, and then wait for others to try to find it. A typical cache can contain a logbook for seekers to sign once they've found the cache and small objects such as buttons, pencils, and markers for seekers to take and replace with some other kind of object. A website and app allow geocachers to post hidden caches, clues to their whereabouts, and comments on their finds (see www.geocaching.com).

There are multiple ways to approach the event of geocaching. For some the event can become one of collecting and reporting the most caches found. For others the event provides opportunities to explore, walk, and learn about new areas. For PBL preservice teacher candidates, a geocaching activity provides strategies to learn more about the history, culture, and stories of places as well as the mathematics of positioning and locating. After sharing maps of different areas near and outside the university where caches were hidden, preservice teachers discuss in small groups which caches would be interesting to find and why.

Preservice teachers ask questions of each other to explore how the maps, titles of the caches, and cultural knowledge of the place could be opportunities for their students to learn more about the stories of the land in which the geocache was hidden. There were not ready answers to the questions PBL teacher candidates asked. Instead, they researched responses themselves. Some researched the historical stories connected to the street names of the area; others researched the important attributes of the land for local Indigenous people and how the place names were reflected

in the stories; still others researched the names settlers gave to particular areas. Activities inspired by Bragg and Skinner (2011) lead to explorations of longitude and latitude mapping position and determining location on inflated balloons representing the earth. Learning more about direction and orientation was also included. Due to time constraints, searching for a geocache was left to preservice teachers to follow outside of class time. However, time was given to consider how the class might design their own geocache, where it would be placed, the kinds of hints that could be given so that others could find the cache, and how it would be named. This activity brought preservice teachers together to learn more about the historical and cultural contexts of the places around their practicum schools and how they might engage their future students in designing their own class geocache.

Teacher Perspective (Fil): Designing Place-Based Problems for Students

I often wonder what things might look like had I considered more purposefully to follow PBL methods in my classroom from day one. Now, 4 years into my teaching practice at a provincial school, having gained some experience with ministry, district, and school-wide programs, acronyms and learning outcomes, and having gained confidence with classroom management, I now feel I'm able experiment with different approaches to learning and teaching. My approach so far can best be described as a loose, if not coincidental, intersection of PBL and place-based, culturally relevant education. By no means would I consider my practice to adhere to any coherent well-defined principles, and I freely admit that I've been loosely stepping near and at times blindly stumbling around what could be termed a consistent pedagogical problem based learning or problem-based education approach.

This spring, in Oregon, I happened upon an improvisational gathering. At first, I considered the group to be a random collection of eccentric individuals. However, after a few days, I began to see their improvisational jam not as a collection of individuals doing separate tasks or talking in ways that announced their individuality, but instead more as a codependent group where group harmony mattered. One individual started a task or conversation, and others responded in their own ways. The response evolved as it undulated through the group and flowed like a dance or improvisational jam. In a way, this response to stimulus is how living things function in ecosystems. David Sobel (2008) argues that classrooms, viewed through a complexity lens, are much more like fluid ecosystems than top-down hierarchies frozen in time. Is a classroom then a sort of improvisational jam, where students and teachers are learning from each other, reacting to each other, like a conversation, in the holistic ("wholistic") sense?

Providing a meaningful, engaging, real-world problem for students is a challenging task for a teacher. A quick glance at the prescribed learning outcomes for any grade, and any subject, reveals that integration and improvisation are both difficult and challenging. If I think of my classroom as a sort of in-the-moment improvisational act where I react to students and they react to me, how can I design worthwhile problems for students that are both meaningful for them in this place and satisfy the ministry-prescribed learning outcomes?

The challenge is not trivial: In order to provide real-world, integrated problems of which the students in a multigrade classroom are a part, then I as the teacher need to access a deep understanding of the learning outcomes across several grades and all subject areas in order to be able to identify, combine, and deconstruct learning outcomes and to recognize when the learning outcomes are met. I need a willingness to experiment and support from my administrators to do so. My pedagogy needs permission to get messy and, perhaps, the freedom to teach with no preconceived notion of where it will all end up. It is difficult to play around with outcomes when they are, literally, prescribed. In short, it is much easier to systematically tick off boxes of learning outcomes in terms of whether the students "get it" or not, than to walk out on the limb of a tree with little support. As I reflect on the memorable teaching and learning moments of my past several years, they have all been, without exception, messy, open ended, and designed in ways that could be described as building the scaffolding while at the same time building the tower. The gwenis problem is a good example of my attempt to offer my grades 5, 6, and 7 students PBL and be open to the unpredictable mess that PBL teaching can bring.

Problem Based Learning Task: Gwenis

The gwenis problem began as a brief mathematics lesson. It evolved into the sort of improvisational jam that can get messy and which I've seen little evidence of in curriculum resources. Gwenis (pronounced wa-neesh) is a small landlocked kokanee salmon that is found in only a handful of lakes in the world. One such lake is in our community, and gwenis was an important traditional food source in the winter months. People emerged from their siskins (underground pit homes) to gather the fish that had washed up on shore. I had taken a recent photo of a gwenis and so began my lesson by sharing this photo with my students. I invited our cultural language teacher to the class to provide a cultural context for the photo, and together we used the story of the gwenis to form the context of the math lesson and also the cultural language lesson.

As we discussed the gwenis and studied the photo, I realized that I had forgotten to collect the measurements of the fish I had photographed while at the beach. Examining the photo more closely, I wondered if the students could use the Douglas fir tree cone lying beside the fish as a way to figure out the measurements of the fish. I posed the problem. I hadn't planned to pose this problem. It was purely an accident, but it was a genuine problem.

The class talked about it. I knew that the problem was not easy, because when I asked, "how could you find out how big the fish is?" some of the grade 5 students stretched their palms apart to about shoulder width and said "this big." I knew, from our PBL classes in our teacher education program, and in particular Cynthia's open-ended teaching, to simply say, "Ok, what do others think?" Other students stated that the fish was over a meter in length, since that is how big the image appeared projected on the whiteboard. I smiled gently, knowing this was a good problem, and, although I hadn't anticipated posing it, knew that it offered us a good place to explore some mathematics. A grade 7 student noticed that if length were determined by how large the fish was when projected on the screen, then the length would change depending on how far the projector was from the screen. We tested that conjecture by moving the projector closer and further from the screen. I became aware of many implicit lessons in that picture: ratio and proportion, magnification, object/image relationships, measurement, scale, dimensionality, etc. Which ones should I focus on in this moment? How much guidance should I provide? Should I let the students decide?

I recognized that for grade 5 students, the photo could offer a measurement lesson, whereas for older students, it could be an introduction to ratio and proportion. The students requiring more support could have specific roles in their groups, such as "fish illustrator, materials gatherer, or ruler operator." At this point, my mind was racing with ideas. In some ways, this immediacy became not only a mathematics

problem for students but also a pedagogical inquiry problem for me as well. Ironically, I wondered if I should have planned it better. Perhaps with more planning, I could have addressed many more learning outcomes and could have provided more scaffolding for students. On the other hand, I couldn't help but think about my overplanned lessons and how such planning sometimes narrows the possibilities for exploration, noticing the unexpected, and genuine, problem posing and solving.

From this whole-class brainstorm and discussion, during which I tried to make sure every student understood the problem, I explained that they had everything in the classroom at their disposal including our class collection of ponderosa pine and Douglas fir cones as well as needle clusters (from which they could work out average length). I grouped the grade 7 students in pairs and encouraged them to work together, while the grade 5 and 6 students were assigned to multigrade groupings and given large pieces of paper and their math journals.

Conclusion

As our cases of teaching with and from problem based learning illustrate, creating tasks for students or for preservice teachers can form rich contexts for pedagogical and/or mathematical inquiries. However, at the teacher education level, Fil's case indicates that learning to teach through PBL and through tasks such as those shared by Cynthia doesn't necessarily provide explicit approaches for how PBL might be used by teachers in classrooms with their students. In addition, although teaching cases used in the PBL program highlight issues of teaching in rural and Aboriginal contexts, it was the practicum experience that seemed to dominate as a resource during the first year of teaching. The experiences of researching case issues provided opportunities to gain knowledge of the issues outside the classroom; however, it was teaching experience itself that grounded and extended this knowledge.

Providing increased opportunities for preservice teachers to design tasks or problems that are inspired by context place or land in which they are teaching during their practica may provide the support needed for them to, as Fil states, take the invitation for improvisational jamming and problem based learning in their own classrooms. The fact that Fil had opportunities to experience and study math and learning to teach through problem solving in his teacher education program, but that these experiences were not necessarily a prominent resource for him in his first years of teaching, remains significant. Although these social justice issues were recognized as interesting and important, finding the balance between posing these kinds of problems, teaching through problem based learning, and meeting the Ministry intended learning outcomes was challenging.

For the gwenis problem, it has become a thematic entry into other subject areas such as science, social studies, language and culture, fine arts, language arts, and math. Working with the cultural language teacher Fil has developed an awareness of language, culture, and subject matter that provides confidence that some, not all, of

the required Ministry intended learning outcomes can be met. However, recognizing that problems such as the gwenis problem were meaningful for students comes more from the reverberations to the greater community, the discussions around family dinner tables about traditional cultural practices and the resulting interest in elders sharing their knowledge in the classroom, and the extended discussions about Aboriginal fishing technologies, seasonal awareness, food sources, nutrition, and history. The land and place provide inspiring problem based learning tasks and engage our students in subject matter content, social justice issues, and culturally responsive education.

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