CREANDO CON CIENCIA: CREATIVE ENTANGLEMENTS IN THE DLI SPANISH SCIENCE CLASSROOM

by

ELIZABETH DUBBERLY

(Under the Direction of MELISA CAHNMANN-TAYLOR)

ABSTRACT

This dissertation seeks to illuminate additive significance of the entanglements within a Dual Language Immersion Spanish Science classroom where arts-based pedagogies are employed. Using a theoretical framework that combines Jane Bennett's Vibrant Materialism (2010) and notion of Enchantment (2002) and Gloria Anzaldúa's concept of Nepantla (2015), the study posits DLI classrooms as in-between spaces that disrupt binaries of school knowledge/home knowledge, English/Spanish language use, arts/scientific disciplinary knowledge and researcher/research data. Bennett and Anzaldúa coincide in their view of the porosity of human and non-human relationships, the interconnectedness of all things, ontological monism, and the use of visual, translingual, and poetic notes in research and theory.

The empirical study that forms the basis of this dissertation involved applying qualitative research methods to the experience of three elementary school teachers in Georgia who integrated arts-based methods into their Spanish science lessons. The study combined hermeneutic phenomenological research (Seidman, 2019; van Manen, 2016) and poetic inquiry (Cahnmann-Taylor, 2003; Faulkner, 2020; Glesne, 1997; Richardson, 1993) for data collection,

analysis, and interpretation. Phenomenology and poetic inquiry are particularly effective methods for affording access to the entanglements of the DLI classroom as a research site because of their openness to all aspects of the experienced assemblage in a given context. These methodologies prioritize evocative, aesthetic language to communicate experience, assume that the experience of the other is marked by indeterminacy, and reject dualistic categories.

Findings chapters focus in turn on student experience, teacher experience, researcher experience, and how these are intertwined and entangled within the DLI Spanish science classroom context. Recognition of these entanglements is theorized as understanding of/from the in-between. Understanding of/from the in-between uses a mindset that assumes a continuum of identities, including the materiality of home and school selves and an interconnectedness of ideas, things, and beings that leaves room for indeterminacy, surprise, connection, and a surplus of learning. Schools, teachers, and researchers that acknowledge and cultivate understanding of/from the in-between create spaces for further connection and surplus significance within the classroom assemblage.

INDEX WORDS: Science education, Phenomenology, Arts-based research, Poetic inquiry, Arts-based pedagogies, Dual-language immersion, Spanish, Elementary education, World language education, Bilingualism, Vibrant materialism, Jane Bennett, Gloria Anzaldúa, Nepantla, Enchantment

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B.A., Wheaton College, 1997

M.A., Wheaton College, 1998

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2024

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May 2024

DEDICATION

Yo no sé de dónde soy,
Mi casa está en la frontera…
Mi patria es un rinconcito,
el canto de una cigarra,
los dos primeros acordes
que yo supe en la guitarra.

—Jorge Drexler, 1999

Este trabajo se lo dedico a mi lugar, un paisito que se define por estar “a orillas de” y “entre.” A esta identificación se agrega un cielo celeste y el sol de mayo, el canto de los pájaros pintados, la murga y la milonga, el recuerdo, la payada, y el olvido. Ahí aprendí a ser “en relación con.” Pero más que todo esto, mi pago es donde están los míos, Robert, Emma, Henry y Julieta, Milo y Alfonso, que en conjunto son mi cielo, mi sol, el río y la plata.

ACKNOWLEDGEMENTS

Gracias a la vida, que me ha dado tanto.

—Violeta Parra, 1968

Gracias a la vida que me ha dado tanto:
A committee of brilliant professors and scholars—
Emily, Ruth, Petros and my advisor, Melisa.
Como creer la suerte que ha sido mía,
tenerlos al lado y a Misha como mi guía.

Gracias a la vida que me ha dado tanto:
For those who assisted when I was so tired—
Lou, Jenn Graff, Kadianne, Ezequiel y su trio,
poets Yixuan, Nancy, and Katie, "it's gonna be fire."
and the Expert Eye Edits of Lee Ann Pingel.

Gracias a la vida que me ha dado tanto:
Compañeros de años de orden y relajo.
Valor de Varela, Jodit, Shiny y Pickle,
Maestros y profes, comadres y hermanos,
Y las que se prendieron a este trabajo.

Gracias a la vida que me ha dado tanto:
me ha enseñado que hay alumnos y teachers.
Entre hijos, vecinos, amigos, perritos
la gran alegría de formar famiglia
por veintinueve años con el gaucho Tito.

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CHAPTER 1

CRITICALLY CONSCIOUS TEACHING IN THE BILINGUAL CLASSROOM

Introduction to the Researcher and the Study

This study seeks insights into the experience of teachers who incorporate arts-based pedagogies into science instruction in a dual language immersion (DLI) elementary school. I am interested in the spaces between the curricular boundaries of science and arts, the linguistic borders of English and Spanish, the ontological distinctions between human and non-human, and the entanglements along the continuum between research data and researcher. In this study I ask what it is like to be a DLI teacher using arts-based pedagogies to teach science.

My experience of bilingual education began with my own bilingual childhood in Uruguay and has been informed by my life as a bilingual parent and teacher in Uruguay and Georgia. While living as a bilingual student, parent, and teacher, I have been aware of being "in-between" languages, cultures, and educational expectations. Below, I share personal vignettes with the goal of illuminating and complicating two terms that are central to this study: "Science Knowledge" and "Teacher." These vignettes introduce the reader to me as the author, and also to a device in phenomenological research. The phenomenological vignette or anecdote is an explanatory description that communicates the singularity of personal experience while also highlighting its universal aspects (van Manen & van Manen, 2021).

Phenomenological Vignette 1: My "Science Knowledge" Life

When I was an elementary school student in Montevideo, Uruguay, in the early 1980s, science class was where I learned facts while seated indoors. The mandatory national curriculum

was a half-day program; private schools were free to add anything to the other half day. At St. Agnes, my bilingual elementary school, each grade level had two teachers: the Spanish teacher taught the *programa uruguayo* (national curriculum) during the morning, and a second teacher taught the same subjects again, in English, in the afternoon. Though my classmates and I had science class twice, in English and Spanish, we did not have science textbooks, lab experiments, or field experiences in either language. Teachers would dictate or write out information about gravity, photosynthesis, or microbes, and the class would copy what was said into our notebooks with a fountain pen (never pencil or ballpoint!). The teacher, along with her knowledge, was the center of the science experience in both English and Spanish.

Outside of school, I spent a lot of time with family: *tío* Felipe and *tía* Gloria were retired and cared for me while my parents worked. Felipe had an enormous garden where he showed me how to graft fruit trees and identify birdsong even while the Spica radio played tangos in the background. Gloria and I dried *yuyos* (medicinal plants) for teas and cooked together *al ojo* (measuring with the eye). Food was central to our lives, and getting and preparing it took a lot of time, effort, and money. Animal bodies were on display at the *feria* and in the butcher shops. I cleaned fish every week, and we made soup with the head and bones. On special occasions, we ate beef thymus, tripe, entrails, and brains. My mother let me cut up and compare the chicken and cow hearts, kidneys, and livers before she cooked them. In addition to flora and fauna, living and dead, I had access to tools in Felipe's shed, chemicals in my brother's darkroom, and expert opinions about all manner of things from neighbors, tradespeople, vendors, relatives, and friends. I was always with someone, tinkering, building, growing, testing, slicing and investigating.

My parents managed a camp, and our family spent December through March (summer in the Southern Hemisphere) at the beach. I was largely unsupervised and wandered the ocean

shore and the marsh with summer friends, following *arroyitos* (little creeks) inland and prying mussels off of rocks. As I got older, I spent less time in the tide pools and more time lying in the shade of the orange fishing boats with my neighbors Leticia, Gabriela, and Rut, playing cards, translating radio songs for cash, and planning our evenings. Nights were incredibly dark, ideal for identifying constellations, fishing by lantern, and discussing the sophistication of cities like Chicago, where nothing was sandy.

When I moved to the United States for college, I went from feeling very right to very wrong. Chicago was, indeed not sandy, but I felt cold, out of place, homesick, lonely, and profoundly un-American. Translating Roxette songs into Spanish had not adequately prepared me to talk to American teenagers. I was totally unfamiliar with cafeteria food that was served at the dining commons; I had no experience of breakfast cereal, which was a staple for many Frosh. I was unsure of what professors expected in my college classes, and embarrassed to explain that I came from another country, a different kind of school system and another language. I only heard my deficits: I had no idea what the word "syllabus" meant; I did not have any science AP Exams; I couldn't sing an English song about the periodic table that everyone else seemed to know. No one ever asked me about penguin nesting grounds, Southern right whales, *butiá* palms, amethyst mines, or anything else about Uruguay or life in South America. It never occurred to me to volunteer what I knew about *yuyos*, or that my birds flew north, not south for the winter. I didn't realize that *arroyitos*, film developing, and fruit tree grafting were valuable sources of science knowledge. The things that I knew about did not seem important at all in sand-free Chicago.

In my experience as a learner, there was a profound distinction between school and home science knowledge. One was ink-stained and static, and the other was sandy, bloody, smelly, dirty, loud, often delicious, and populated with characters. There was also an important

separation between what was expected American science knowledge and Uruguayan (English and Spanish) knowledge. I felt that I was bad at one, and great at the other. For a long time I believed that the lack of alignment was a language deficit or intelligence failure. In the literature review that follows, I will show that this perceived distinction between home and school science knowledge is not unique to my experience.

As a researcher and educator, I value creating opportunities for connections between home and school knowledge. It is also personally satisfying for me to help clarify American school norms and expectations for Spanish-speaking teachers and families. This study is part of my life project to understand teacher and student experience of existing between languages and cultures.

Phenomenological Vignette 2: My "Teacher" Life

In 1998, I returned home to Montevideo with my young child and American spouse and began teaching high school. My personal "in-between" identity was reinforced professionally in my first job, teaching Theory of Knowledge (TOK), the foundational course of the International Baccalaureate Diploma Programme. In this seminar class, students study epistemology and culture, and learn how different academic disciplines are interconnected. Teachers work with students to apply different disciplinary techniques to their existing assignments in math, science, history, and literature, playing across subjects. Teachers consider TOK a positive professional experience that heightens their own interdisciplinary understanding (Bergeron & Rogers, 2019). Working in TOK meant that I began my teaching career with a philosophical and practical understanding of interdisciplinarity in schools. Teaching "in-between" and across school subjects was a joyful and exciting experience. A significantly less delightful development was the revelation that the financial director of the school, St. Carmen, had stolen the teachers' pension

fund under the guise of transferring it from the government social security system to the new privatized AFAP (similar to a 501k). This was one example of the precarity that undergirded life in Uruguay in the early 2000s.

In 2001, I joined the staff of Uruguay International School (UIS), a school catering to expatriates. (Other than the University of Georgia, all school names are pseudonyms.) With a B.A. and M.A. from an American university, I was a valuable, "American" asset to the school. My responsibilities included managing the SAT and ACT tests and supporting students in their college applications. However, as a Uruguayan "local hire," I was not eligible for payment in U.S. dollars like my "foreign hire" American colleagues. At work, I found myself "in-between" my American and Uruguayan identities. When there was a major devaluation of the Uruguayan peso in 2002, the "foreign hires" on the dollar scale did not see a wage difference, but local Uruguayan employees saw our paychecks lose two-thirds of their value. I loved living at home in Uruguay and was happy to have a secure job at a school for expats. However, these were lean and uncertain years.

In 2008 my family moved from Uruguay to Georgia. With two school-aged children, elderly parents, and a graduate student spouse, finding a full-time job with benefits was an urgent priority. There were no local IB Diploma Programmes that would accept my teaching credentials. The state of Georgia required a year-long student teaching practicum as a prerequisite for obtaining a teaching certificate. At that time, taking a year off to study and work as an unpaid student teacher was not an option. Instead, I found a job as a Spanish teacher at a private school that offered tuition waivers for my kids and health insurance for my family. Once again, I was professionally "in-between." This time, I was learning how to be a Montessori teacher, a Spanish-language teacher, and an early childhood educator after ten years as a high

school teacher. Nine years later, I left that post to work in my local public school system as part of the federal Migrant Education Program (MEP) in a classified (non-certified), paraprofessional role.

As a Migrant Education Specialist, my job was to push into classrooms and help migratory students access classroom content, making connections across disciplines and languages. These tutoring experiences were unique, tailored to each child and classroom. With a fourth grader who was tired of looking at geometric shapes on the Chromebook screen, I folded paper shapes and counted the lines of symmetry in English and Spanish. A kindergartener and I made "sight words hopscotch" with sidewalk chalk. By then, I was also a graduate student at the University of Georgia, learning about arts-based pedagogies and the scholars who understood these methods to be tools for critical, multicultural education and social change (Cahnmann-Taylor & Preston, 2008; Chappell & Cahnmann-Taylor, 2013; Chappell & Faltis, 2013; Guyotte, 2020; Guyotte et al., 2014).

During my time as a MEP Specialist and Montessori Spanish teacher, I met others who had moved to the southeastern United States and found themselves "in-between" certifications, qualifications, languages, and cultures. My experience of personal, professional, and financial "in-betweenness" was not unusual. In conversations with private school Spanish teachers and MEP classified employees who had emigrated as adults, I heard many stories that echoed my own experience. These educators arrived in the United States and needed jobs right away to support and provide health insurance for extended family, or they felt that they could not spare the time and expense associated with local certification. I became very interested in learning more about teachers who find themselves or consciously place themselves in "in-between" spaces. This led me to focus my research study on the experience of DLI teachers who are

linguistically and culturally "in-between" at work and who add another layer of in-betweenness by teaching across disciplines, using arts-based pedagogies in their science lessons.

My experience of "in-betweenness" has changed over time. The sense of being *ni una cosa ni la otra* ("neither one thing nor another") in the United States has been profoundly impacted by the theoretical work of Gloria Anzaldúa and Jane Bennett. In recent years I have sought to follow Bennett (2001) and anchor my "in-between" identity with an affect of enchantment over a "cultural narrative of disenchantment" and resentment (p. 4). For example, between the 2019–2021 school years, I collected data about paraprofessional educators, immigrant educator qualifications, and pay scale comparisons from a social justice hermeneutic, and felt frustrated and stuck with my "in-between" educator status. It was through an assemblage analysis assignment for a phenomenological research project at the University of Georgia that I realized that I was characterizing my experience and that of other parapros primarily in terms of economic injustice, which did not adequately sum up my full reality. The truth was that my time as an MEP parapro and a "local hire" teacher in Uruguay were defined by many things, including profound joy and freedom, that were as significant as the financial worries. Anzaldúa's (2015) call for critical reflection and dwelling within the "in-between" space, combined with Bennett's (2010) vibrant materialism, has helped me develop a more nuanced understanding of my "in-betweenness," as itself an actant thing.

Since 2021, I have been working as a University of Georgia Graduate Assistant at a Spanish-English dual language immersion (DLI) school, Otis Elementary School (OES). In this position, I work with teachers and paraprofessionals who are in a learning environment that is explicitly "in-between" languages and cultures, where classes are taught in English and Spanish. "Spanish DLI teachers" teach curricular subjects in Spanish; "English DLI teachers" teach

curricular subjects in English. Once again, I find myself "in-between": I am neither a teacher, nor a coach, nor an employee of the school. In this role, I am a researcher, paid by the University, with no supervisory task. I understand my work to be supportive of teachers and staff as they carry forward the DLI program in the Charrua School District (CSD). I provide assistance to teachers in lesson planning, assessment, record keeping, instruction, and communication with the community.

Being an educator has been a part of my identity for the last twenty-five years. Over time, the exact nature of my work has shifted along a continuum: homeroom teacher, Spanish teacher, history teacher, preschool teacher, migrant ed tutor, research assistant. In each job, the professional and personal "in-between" of languages, qualifications, and obligations have been an integral part of my self-understanding as an educator.

As I embark on this study, I am aware of how much the term "teacher" has been a part of my life. There have been benefits and difficulties associated with my credentials, language skills, and national identities; there have been delightful and dreadful colleagues and work situations. It is important that I remember the wideness of my lived reality as a teacher while allowing for the indeterminacy of others. In this study, I hope to encounter teachers in a way that is interested in and attentive to their experience.

Note about DLI Staff at Otis Elementary School

There are some important distinctions with the DLI staff at OES and my experience of other bilingual educators (in private schools or in "classified" positions within public school systems, such as Migrant Education Specialists) since my arrival in Georgia in 2008. A major difference is economic. At OES, teachers with training or experience teaching in Spanish-language countries are eligible for alternative Georgia teacher certification, Georgia Teacher

Academy for Preparation and Pedagogy (GaTAPP), paid for by the local school district. While the Spanish DLI teachers pursue their alternative certification, they are paid on the Georgia provisional certified teacher scale and are eligible for Georgia teacher benefits, including life insurance, health insurance, and the Teacher Retirement System pension plan. Spanish-speaking individuals can be hired as paraprofessionals without needing to prove English proficiency. Degrees earned in Spanish from institutions in home countries are honored and used to determine steps on the pay scale. The tangible economic value ascribed to the Spanish speaker's skills is coupled with the more ephemeral importance ascribed to the cultural capital (Bourdieu, 1986) that the Spanish DLI teachers and Spanish-speaking parapros bring to OES. Without the linguistic and social knowledge that they embody in their Spanish speaking selves, the DLI program could not exist. In short: the "in-between" language and cultural identities and skills of Spanish DLI teachers and paraprofessionals are highly valued at Otis Elementary School.

Theoretical Framework

The theoretical framework grounding the study is informed by two main ideas: the *nepantla* understanding of "in-between" identities as described by Gloria Anzaldúa (2015) and the vibrant materialism of Jane Bennett (2001). Bennett and Anzaldúa share a monist ontology, rejecting dualisms and assuming an interconnectedness between nature, humans, and things (Anzaldúa, 2015; Bennett, 2010; Keating, 2015). As researchers, Bennett and Anzaldúa are willing to experiment with epistemological limits, seeking to know with and as things (Bennett, 2010; Shaeffer, 2015; Zaytoun, 2015), and with forms of communicating research (Anzaldúa, 2012, 2015; Bennett, 2020). Finally, both Anzaldúa and Bennett emphasize the aesthetic aspects of language, particularly poetry, and consider art and creativity to be integral to the development of

a “reservoir” of ethical understanding, imagination, and healing (Anzaldúa, 2015, p. 66; Bennett, 2001, p. 128).

In-Between/*Nepantla*

Gloria Anzaldúa (1942–2004) was a Chicana feminist scholar who wrote about her overlapping identities: Mexican-American, Texan, disability activist, LGBTQ activist, feminist, teacher, artist, poet, *mestiza*. These identities were all integral to her writing and scholarship. As a teacher in the federal Migrant Education Program working with children whose families moved for agricultural jobs, she built on her experience as the daughter of farm laborers. In this work, Anzaldúa saw the realities of “borderland” students who existed between languages and cultures while physically moving between schools and towns when their parents followed crops. These students experienced some things that Anzaldúa had lived through as a child: linguistic isolation, xenophobia, and a “compulsory, complete and absolute assimilation to U.S. culture, language and norms” in schools (Cantú & Hurtado, 2012, p. 5).

Anzaldúa spent most of her career as a full-time writer, often rewriting manuscripts (Keating, 2009). Her theories were presented as conference papers, doodles, journal articles, and open letters that were subsequently re-edited, re-written, and re-issued. In this paper, I work primarily with two posthumously published volumes. *Borderlands = La Frontera: The New Mestiza* was first published in 1987, but she continued to make notes and edits until her death in 2004. I am using the 25th anniversary edition (also counted as the fourth edition), which includes interviews and editorial notes. Her second book, published in 2015, is *Light in the Dark/Luz en lo Oscuro: Rewriting Identity, Spirituality, Reality.* This text served as her doctoral dissertation and was the manuscript she was working on at the time of her death. It includes several earlier

pieces that had been revised and reworked. I do not cite individual sections from *Light in the Dark/Luz en lo Oscuro*, but take it as a complete text.

Borderlands/*la frontera* is a foundational metaphor for Gloria Anzaldúa . Writing about the area between the United States and Mexico, she argues that borderlands are not only geographic or political: "Borderlands are physically present wherever two or more cultures edge each other, where people of different races occupy the same territory, where under, lower, middle and upper classes touch, where the space between two individuals shrinks with intimacy" (2012, p. 19). These borderlands are not only external:

> Our psyches resemble the bordertowns and are populated by the same people. The struggle has always been inner, and is played out on the outer terrains. Awareness of our situation must come before inner changes, which in turn come before changes in society. Nothing happens in the 'real' world unless it first happens in the images in our heads. (p. 109)

The text of *Borderlands/La Frontera* is itself an embodiment of Anzaldúa's *mestizaje*: it is a multi-genre, multilingual text that employs a variety of English and Spanish dialects and registers and refers to indigenous and African diaspora folk traditions (Cresci, 2022).

Light in the Dark/Luz en Lo Oscuro is a posthumous publication of Anzaldúa's later work, and represents some major shifts in her thinking from what the editor calls "the twentieth-century to the twenty-first-century versions" (Keating, 2015, p. xv). There are three major concepts from *Light in the Dark/Luz en Lo Oscuro* that are especially relevant for bilingual education and expand on the metaphor of the borderland/*la frontera*: *nepantla* (p. 71)*, la rajadura* (p. 81) and *el cenote* (p. 98). Through acknowledging *nepantla* liminality, the identification of *rajadura* (slash-identities), and the practice of *cenote* (pool as metaphor for renewal and knowledge), bilingual educators and students create a critical understanding of their place in-between languages and cultures.

Referring to the area between the United States and Mexico, Gloria Anzaldúa (2012) wrote that *la frontera* was a place of conflict, contradictions, and dualities: male/female, English/Spanish, immigrant/native, either/or. Later she developed an alternative theorizing about this "in-between" place, using the Nahuatl word *nepantla*, meaning "in-between" (2015, p. 56). *Nepantla* develops the idea of the borderland/*frontera* from "an open wound/*una herida abierta*" (2012, p. 25) into a "space in-between, the locus and sign of transition" (2015, p. 17). Anzaldúa urges readers to reframe borderland dwelling as an opportunity for cultural transformation, "rewriting narratives of identity, nationalism, ethnicity, race, class, gender, sexuality, and aesthetics" (2015, p. 8). *Nepantla* grows out of Anzaldúa's earlier challenge to develop a *conciencia mestiza* (*mestiza* consciousness) that extends in-betweenness beyond language and culture into other areas of existence and scholarship (2012, p. 99). This "borderland consciousness" engages with precarity as cultural legacy (p. 112) and calls for a "tolerance for ambiguity" (p. 101). Borderland consciousness is a willingness to live within the borderland, aware of the baggage that it entails but embracing a third element: the "in-between" identity, the "uprooting of dualistic thinking" (p. 102). When a person finds herself accepting and settling into the ambiguity of the "third space" beyond dualities of the border/*frontera,* that person enters into *nepantla,* a place of critical self-reflection about identity, cultural inheritance, and practice (2015, p. 127). The critical bilingual/bicultural person does not simply have two adjacent ways of perceiving the world (English and Spanish) but creates a third place: *nepantla* is home.

Vibrant Materialism

This study is also informed by Jane Bennett's vibrant materialism, which emphasizes the "actancy" of things (2010, p. 10), the "porosity" of human and non-human relationships (2010, p. 13), and an attachment to enchantment (2001).

Bennett is a political scientist who writes within the framework of cultural studies. Like Anzaldúa, Bennett is somewhat difficult to categorize: she writes about ethics, art, literature, ecology, garbage, and life in the Anthropocene. She describes herself as a materialist "in the tradition of Democritus-Epicurus-Spinoza-Diderot-Deleuze more than Hegel-Marx-Adorno" (2010, p. xiii) As such, Bennett is within the New Materialist school that developed in the 1990s and 2000s, aiming to "renew" the materialism and existential phenomenology rooted in scientific, cultural, and linguistic understandings of 19th and early 20th century European thinkers such as Marx, Nietzsche, and Freud (Coole & Frost, 2010, p. 7).

Jane Bennett and Gloria Anzaldúa did not engage with each other's works. However, when braided into Anzaldúa's concepts of *nepantla* (in-between space), *la rajadura* (slash identity), and *el cenote* (the pool) Bennett's "vibrant materialism" is helpful 'as we consider bilingual education. Specifically, Bennett's development of "enchantment," "vibrant matter," and "influx and efflux" help to illustrate the concept of language and language learning as an assemblage. The emphasis on the liveliness of all matter, not just human systems, sets Bennett's materialism apart from that of Marx, Nietzsche, and Freud (Coole & Frost, 2010) and aligns with some aspects of Anzaldúa's disruption of human and non-human binaries (Anzaldúa, 2015). Anzaldúa's work is best understood within the framework of post-humanism (Keating & Merenda, 2013) and new materialism (Keating, 2015). Some contemporary scholarship has brought Anzaldúa's work into conversation with Bennett's vibrant materialism and other post-humanist philosophies (Bost, 2019; Ishii, 2021; Schaeffer, 2018; Scott & Tuana, 2017; Zaytoun, 2018).

Because all matter is vibrant, it is worthy of being approached with enchantment, in "a state of wonder" (Bennett, 2001, p. 5) that is marked by surprise and engagement. Enchantment

is also relational, an "ethic of generosity toward others" that can be "cultivated and intensified by artful means" (p. 10). This ethics of enchanted materialism is not theological or teleological: it is based on "becoming more responsive to other material forms with which one shares space" (p. 187) and on being attentive to principles of reducing harm within that interconnectedness. This is an important departure from Anzaldúa, for whom there is a pronounced spiritual dimension. Following the thinking of Richard Flathman, Gilles Deleuze, and Félix Guattari, Bennett notes the importance and limits of language in the creation of ethical understandings and assemblages, but argues for the ability of language to generate enchantment. Including the arts in the assemblage of language learning can cultivate the process of enchantment.

Bennett's idea of "vibrant matter" begins with recognition that humans and non-humans are intertwined. From this arises the possibility of "thing power," or "the curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle" (2010, p. 6). Thing power does not imply that matter is alive or has a will or a soul, but rather considers that things have actancy and vibrancy in themselves outside of human or divine creation or purpose. Humans participate in a "shared, vital materiality" with nonhumans, and co-participation is an ethical and aesthetic exercise, the root of which is attentiveness (p. 16).

Thing power is especially evident within an "assemblage," in which diverse things interact with each other (and with humans) but are not governed by one set of rules (p. 24). This philosophy has a political goal: the "broader definition of 'self' and 'interest'" as it seeks to "distribute value more generously" among humans based on materiality (having a body) and connection to other material bodies in the world rather than ascribed morality (having a particular type of body) (p. 13). For example, the bilingual classroom is an assemblage in which classroom objects (e.g., textbooks) have thing power (Gurney & Díaz, 2020).

Ontological and Material Interconnectedness: Anzaldúa and Bennett

Anzaldúa and Bennett together provide a theoretical framework for this study. It is from ontological and material interconnectedness that Anzaldúa (2015) understands *nepantla* and Bennett (2010) theorizes vibrant matter. This primary assumption impacts the entire study, as it presupposes connections across disciplinary and curricular areas, entanglements between human and non-human elements in the DLI classroom, and the importance of the teacher's lived experience.

This framework grants expansive epistemological research permissions. Both theorists write about knowing through the production of arts-based notes, including doodles (Bennett, 2020) and visual narratives (Anzaldúa, 2015). Both use poems as they seek to understand their research, both quoted and original. Both theorists play with language use, including borrowing phrases and terms in languages other than English in order to capture precise meanings with varying levels of translation, explanation, and grammar. Keating (2015) describes Anzaldúa employing assemblage as a means of gathering data in her writing process; in *Influx and Efflux*, Bennett personalizes the notion of assemblage she lays out in *Vibrant Matter* to her own experience as a researcher by likening her writer's mind to a tidepool. These playful and generous definitions of language and information gathering speak to my interest in poetic and visual inquiry and bilingual data collection.

Statement of the Problem

In a review of the literature dedicated to DLI teacher experience (Cervantes-Soon et al., 2017; Hood, 2020; Navarro Martell, 2022; Venegas-Weber, 2018), to science education (Buxton et al., 2021; Lee, 2020; Morgan et al., 2016; Poza, 2018; Quinn, 2021), and to arts-based education for language learners (Cahnmann-Taylor & Preston, 2008; Chappell & Cahnmann-Taylor, 2013;

Chappell & Faltis, 2013), I became aware of a lack of research about teacher experience in the context of integrating the arts and science in Spanish-English K-5 DLI classrooms. Additionally, it was clear from my work context that federal, state, and district guidelines about instructional minute allocations prioritized math and reading, especially for Title I schools, who are required to show "Adequate Yearly Progress" in math and reading to retain federal funding (Wright, 2019).

The growth of DLI programs, spurred by the increasing numbers of emerging bilingual (EB) students, and students with the federal designation of English Learner (EL), means that there are many students in elementary classrooms across the United States who are learning content while learning an additional language. There is an urgent need to study how teachers experience engaging with language learners while teaching content. This study seeks to add to the current knowledge about language teaching, science education, arts-based pedagogies, and arts-based research. In particular, it seeks to learn more about the experience of Spanish DLI teachers who teach across disciplines, integrating arts-based pedagogies into DLI science classrooms.

Literature Review

This study integrates inquiry about science teaching, arts-based pedagogies, and dual language immersion programs in the United States. As such, it draws on prior research about science educators, bilingualism, and the integration of theatre in the classroom to create meaningful classroom participation. The current study is primarily interested in the qualitative experience of teachers and students in Spanish DLI classes and the use of poetic inquiry and phenomenology as a point of access into that experience. This chapter provides a review of the literature that informed my study design.

Emerging Bilingual and Multilingual Science Learners

Given the variety of people who participate in a DLI study, it's necessary to define some terms. In Two-Way or Dual-Language Immersion programs, half of the students are English learners and half are learning a partner language. In this study, we will often refer to emerging bilinguals (EBs) and multilingual learners (MLLs) as the students who are adding languages to their repertoire through dual language immersion. "Emerging bilingual" describes a person who is in the process of learning an additional language (García, 2009). This term is more expansive than the federal designation of "English Learner" (EL), but it is not a legal term. In 2019, 10.4 percent of all K-12 students, or 5.1 million students, were designated ELs, which means that these students are legally able to receive federally funded English to Speakers of Other Languages (ESOL) services. Of these students, 76.8 percent (3.9 million) were Spanish-speakers (Irwin et al., 2022). I take the perspective that bilingualism is an asset. Thus, I use the terms emerging bilingual and multilingual learner, which carry an implicit acknowledgment of "the challenge and accomplishment of learning more than one language" (Hughes et al., 2022, p. 17). The terms emerging bilingual and multilingual learner also serve to affirm the United States as a society with many linguistic and cultural resources, where monolingualism need not be the default policy or attitude. This study aims to contribute to scholarship in support of this affirmation.

There is significant current research about emerging bilinguals studying science. According to Morgan and colleagues (2016), EBs enter kindergarten with "very large science achievement gaps" (p. 18) compared to their English-fluent counterparts, and these gaps continue through 8th grade, though it is unclear whether these gaps are stable, cumulative, or compensatory. Poza (2018) suggests translanguaging as an example of culturally sustaining

praxis in science education. Buxton and colleagues (2021) extend the perspective of "funds of knowledge" in the science classroom with their findings that emergent bilingual families

> disrupted the view of science as located solely in formal learning spaces such as classrooms and laboratories. Instead they viewed themselves as engaging with science through work, through relationships with family, and through interactions with nature. In general, the parents and children co-constructed this culturally sustaining view of science through turns of talk that usually began with the parent sharing their widened perspective and the child elaborating or extending it. (p. 20)

In this study, I build on this work by incorporating the world of home science talk in classroom discourse.

Navarro Martell (2022) highlights the roles of the Critically Conscious Teacher—specifically in dual-language science contexts—in ensuring that students have access to rigorous materials and instruction as well as in acting as advocates who see EBs' culture(s) as a "fund of knowledge" (p. 2144). My work draws on Navarro Martell's phenomenological approach and teacher focus, drawing further links with Anzaldua on the value of understanding from a stance in-between and with Bennett on the possibility and value of recognizing enchantment in all forms of experiences.

In the context of DLI at OES, science classes are places for learning language as well as learning critical content. Oliveira and colleagues (2019) claim that for emerging bilingual students, science class dialogue is particularly important, because that is where "oral contributions are taken seriously, are taken up and elaborated by others, and go beyond isolated words aimed at guessing the 'right' answer being sought after by an authoritative teacher." However, this vision of science class marks a shift from canonical science pedagogies to phenomenon-based science pedagogies. Part of the distinct contribution of my study is that it expands further on the value of a phenomenon-based science pedagogy. What follows is a brief

history of K-12 science education before and after the publication of the Next Generation Science Standards (NGSS) and how these changes affect language learners.

K-12 Science Education in the USA Before NGSS

In the United States, science education was considered a matter of national security during the Cold War, and K-12 textbooks, classroom kits, and curriculum guides were a priority investment for school districts (Wissehr et al., 2011). Though materially and linguistically very different, my experience of learning science in Uruguay in the 1980s was epistemologically similar to that of students in the United States learning from science textbooks and curriculum kits. Teacher dictation and textbooks are examples of "canonical science knowledge," in which static information comes from an authoritative source (Bybee & DeBoer, 1994) and is passed on to students. A 2006 U.S. Department of Education report cites a 1999 video study of 8th grade science classes across five countries, in which 84% of science lessons focused on canonical science knowledge (Roth et al., 2006). This method of science pedagogy was widespread at the time of the study in the Netherlands, Japan, Australia, the United States, and the Czech Republic. Reformers in the United States had concerns about this approach to science education. One concern was that transmission of propositions about science required reading, writing, and/or speaking in the target language as a "precursor to learning science" (Lee & Grapin, 2022, p. 1302). The question for science and language educators was how language and literacy could support science learning rather than be requirements to participate in the science class. One important finding of this study is that language and literacy education in the DLI classroom can have a very positive, additive impact on science learning.

Changes in K12 Science Education in the United States: NGSS

The 2012 *Framework for K–12 Science Education and the Next Generation Science Standards* (NGSS) represented a shift in science education in the United States. In contrast to a canonical approach to science education where a textbook or teacher explains facts and vocabulary about science, the NGSS approach begins with a phenomenon as the starting point for the science lesson. Phenomena are observable occurrences, such as wind, air temperature, changes in matter, patterns in nature, or ice melting. Rather than using phenomena as illustrations that segue into a teacher-driven lesson, science lessons are centered on the phenomena, which serve as invitations to develop questions, share assumptions, make predictions, and examine evidence. Where a canonical knowledge-based lesson on heat energy might include a vocabulary list and Fahrenheit and Celsius degree comparisons, a phenomenon-based third grade lesson on heat energy could ask students to use thermometers and chronometers to compare rates of ice cubes melting at various points on the school grounds and using that knowledge to design an "ice cube shelter." The phenomenon-based approach to science instruction illustrates a shift "from learning about to figuring out why" (NGSS, 2016, p. 2).

The expressed goal of the NGSS is for all students to "do science" by connecting their home funds of knowledge (González et al., 2005) with phenomena that are meaningful to them (Lee, 2020). The authors of NGSS make explicit that tapping into those "funds of knowledge" is fundamental to science and math instruction (NGSS Lead States, 2014, p. 30). NGSS makes the bold claim that anchoring science education in phenomena that is meaningful is nonnegotiable because it is vital to social justice.

> Engagement is a crucial access and equity issue. Students who do not have access to the material in a way that makes sense and is relevant to them are disadvantaged. Selecting

> phenomena that students find interesting, relevant, and consequential helps support their engagement. A good phenomenon builds on everyday or family experiences: who students are, what they do, where they came from. (p. 3)

By beginning with events that are relevant, all students connect to the process of building inquiry. The phenomenon is investigated using scientific practices: students learn to ask scientific questions, make predictions, conduct experiments, and gather data from various sources, among other skills. The phenomenon approach redefines science literacy as preparing students to use tools of scientific inquiry and problem solving meaningfully in real life contexts (Quinn, 2021). This study confirms these findings within a DLI context in Georgia.

The Challenge of NGSS in the DLI Science Classroom

When using a phenomenon-based approach, teachers seek to engage students by activating prior knowledge, inviting them to share what they already know about the subject. This invitation can be phrased as a question: "What is your experience of temperature?" or "I wonder if anyone would like to share something about rain?" Typically these questions are asked at the beginning of class, with the goal of introducing the topic, anticipating the lesson, and determining student knowledge (Dale, 2020). *The Science Teacher's Toolbook* recommends that questions about prior knowledge be answered verbally or in notebooks, and discussed in small groups (Dale, 2020, p. 427). In these cases, science education can be seen as bound with oracy and literacy: "Science learning cannot be conceived of without language" (Studhalter et al., 2021, p. 1).

The extent to which phenomenon-based approaches rely on individual students' verbal skills and engagement with classroom dialogue makes this a particularly challenging approach to use with language learner populations. In addition to being a science classroom, the DLI classroom is also a language learning environment; the gestures, linguistic and cultural tools, and

entanglements that make up the semiotic assemblage must be considered (Gurney & Demuro, 2023; Pennycook, 2017). There are important implications for teachers of multilingual learners. One is the shift from a deficit view of language proficiency, in which "appropriate" language use is determined by the listener (Flores & Rosa, 2015). In a school context, this means that teachers can facilitate social transformation by sidestepping the policing of "appropriate" language use, which can marginalize and minoritize students. Rather than allowing students to participate in classroom science only if they are using "appropriate" language, teachers could modify their listening practices to encourage a wider spectrum of student expression. This acknowledgement of the "fluidity intrinsic to bilingual learners" (Flores & Lewis, 2022, p. 266) could lead to a more expansive definition of communication that includes dramatic performance of scientific knowledge. Science teachers who "listen" to students as they act out, draw, or embody their prior knowledge using an artistic modality are heeding the call of the NGSS to actively engage multilingual learners. This study expands on this insight through classroom activities and frames this understanding in terms of in-betweenness and enchantment.

Sense-making: Extra-Linguistic Communication in the Science Classroom

Reigh and Miller (2020) describe the science classroom as a place of socio-cultural practice where learning happens as practices are shared by the community. In their view, language is "relational and reflexive" (p. 2271), and meaning develops as students use and expand available resources. They argue that language learners in a science classroom must be supported to participate fully as practitioners of science, for whom content is a "consequence" (p. 2272) of shared practices. Teachers can model and encourage the use of all available resources as viable means of communication and sense-making: bodily gestures, sound effects, movements. The sense-making resources that students bring with them should be treated with as much respect

as the prior knowledge that they have about scientific phenomena. The idea of the whole classroom environment as full of sense-making resources connects with my discussion of Jane Bennet's idea of things as vibrant matter and of the in-between space as full of possibilities for enchantment. Treating communicative gestures, movements, and interpretative use of objects as assets within a classroom rather than linguistic deficits creates a sense of belonging within the classroom community for all learners (Reigh et al., 2023). Verma and Douglass (2021) suggest that science spaces are democratized by the elevation of lived experience of phenomena. When student experiences are shared, science knowledge is deepened. However, it is important to empower students to share their knowledge, and the classroom language may not always be accessible to them.

An asset-based understanding of student knowledge combined with a generous policy toward extra-linguistic communication means that a science classroom could be a place where students contribute to classroom discourse via acting, drawing, building, embodying, sounding out, or otherwise representing what they know without needing language as a prerequisite for participation. Adding the arts as accepted modes of expression in the science classroom could be a way to encourage language-learning students to interact with phenomena, their classmates, and their teachers. The data and discussion in this study on drama activities in the DLI science classroom support this finding. Sense-making prioritizes student engagement with science and considers language about science to be an outgrowth of this engagement.

A research study by Varelas and colleagues (2014) focused on sense-making in an English-speaking science classroom made up of Hispanic elementary school children. The authors describe and reject the "learning science while Latino/a" narrative, which they describe as deficit-based and focused on the low science achievement scores of students who are

emerging bilinguals or recent immigrants (p. 1251). The authors emphasize the importance of teachers' "hearing students' sense-making" as they cross back and forth between home and school scientific understandings (p. 1251). In the study, a "third space" was established between home and school knowledge where third graders could interact with science phenomena in hands-on activities and then keep notes in a sense-making journal. For example, while studying earthworms, students were able to try to feed and play with the earthworms and display affective connections before writing and drawing in their journals. The scientific classroom goals about the earthworms' body parts, habits, and needs were met, but students were given multiple opportunities to get to that knowledge through sense-making conversations, drawings, observations, and texts. This study provides a similar example in the discussion of how students added to the learning of the whole class through dramatizations of natural phenomena (e.g., the wind) and unique phenomena (e.g., glacier shearing).

Using the Arts to Engage Multilingual Learners with Science: STEAM

In a recent study, Hughes and colleagues (2022) provide a justification for integrating arts into science classes for emerging bilingual and multilingual students.The authors begin with the reminder that "educating students in science is a US national priority" (p. 2) and introduce statistics that show emerging bilingual (EB) students lag behind their English-fluent peers in science and math understanding. Their argument centers on the NGSS documents and the urgency that exists to improve science outcomes for emerging bilingual learners. The authors describe the use of STEAM (Science, Technology, Engineering, Arts, and Math) as a point of entry, with the hope that the "arts" component of STEAM will lower the affective filter (p. 4) of the EB student and activate prior knowledge, engaging them with the material. Later, the content is re-taught as a STEM (Science, Technology, Engineering and Math) lesson. The article

constructs a nuanced argument for using STEAM and STEM together by examining the viability of STEAM as an arts-integration methodology that would align with NGSS Standards (p. 3). Next, the authors center the EB's prior knowledge and culture, valuing the experience of learning language while learning science content. One purpose of centering the language and culture of the EB is to fulfill the equity imperative of the NGSS. This component of the standards identifies meaningful "funds of knowledge" (González et al., 2005, pp. ix–x) that students bring to the classroom, though they may come from linguistic, scholastic, and cultural backgrounds different from that of the school. Tapping into those funds of knowledge is an important part of teaching science and math (NGSS Lead States, 2013): emergent bilingual students cannot access the new content if they cannot make connections to it; teachers cannot know how to teach their students if they do not know about the "multidimensionality of students' experience" (González et al., 2005, p. 6). Integrating the arts' sense of play introduces fun and connection, but it also recalibrates the group dynamic, changing the definition of what "science" is and creating the possibility for dialogue between students whose language and knowledge might otherwise be overlooked (Hughes et al., 2022). Hughes and colleagues are integrating the arts with an important purpose: to engage the funds of knowledge and capacities of students who were not previously valued. This study expands on this line of research by engaging students' home funds of knowledge and incorporating them into the classroom through theatre activities.

Incorporating arts pedagogies as a means of aligning with the equity imperative of the NGSS is an intriguing proposal. The goal of engaging students who were not previously participating in classroom discourse and elevating their funds of knowledge aligns with the goals of my study. An important difference between Hughes and colleagues' research and the current

study is my emphasis on the experience of teachers who are integrating the arts into their science lessons.

Science Learning in the Dual Immersion Context

Immersion language education programs as we know them today began in Quebec, Canada, in the 1960s (Tedick & Lyster, 2020). At that time, a group of English-speaking parents enrolled their English-speaking children in a school where they would receive French-language classroom instruction for part of the day (Lambert & Tucker, 1972). This program was established and monitored by McGill professors despite the objections of local thought leaders, including the Catholic Bishops of Montreal. One of the study's primary research questions was, "What effect does French immersion have on the students' first language (English) skills?" (Swain & Lapkin, 2011, p. 14). The improvement of the students' French and English skills led to the development of the notion of "additive" bilingualism. A feature of additive bilingualism is the value placed on the home language (L1) of the student. In additive bilingualism, learning a second language (L2) adds to existing cultural and linguistic knowledge. In contrast, "subtractive" bilingualism seeks to support students' learning of a second language (L2) with the goal of replacing the home language (L1) with the new language (L2) (Tedick & Lyster, 2020).

Dual Language Immersion (DLI), or Two-Way Immersion (TWI), takes the idea of additive immersion education and applies it to two languages concurrently. DLI seeks to serve two groups of students simultaneously, each with a different L1. Tedick and Lyster (2020) call DLI a "primarily American phenomenon: most DLI programs are in the United States" (p. 7). The goal of DLI is to create class rosters where close to 50 percent of students speak L1 at home, and 50 percent speak L2 at home. In this way, students have a chance to be both "majority" and "minority" language speakers (Valdés, 1997). This model is designed to ensure that both student

groups can develop skills in the new language while maintaining their home language (Armendáriz & Armendáriz, 2002). Within DLI, there are also time percentage designations, such as 90/10, 70/30, or 50/50 that indicate the percentage of classroom time spent on each language. For example, in a 50/50 Spanish-English program, half of the classroom instruction is conducted in Spanish and half is in English. In the United States, the DLI model of bilingual education is "well established, favorably evaluated, and flourishing" (Baker & Wright, 2017, p. 215).

Spanish-English Dual Language Immersion in Georgia public schools is a relatively new phenomenon (Georgia Department of Education, 2019). In her dissertation, *"Uncharted" Territory: An Autoethnographic Perspective on Establishing Georgia's First Public Two-Way Immersion School,* Dell Giles (2010) documents the background and process of setting up a public DLI charter school in 2006. Seventeen years later, there are 48 Spanish-English public DLI programs across 15 counties in the state of Georgia (Georgia Department of Education, 2023). This study builds on Giles's pioneering work and expands it by providing research into one of these 48 DLI programs in GA, with a focus on teachers' qualitative classroom experience.

There are currently two major areas of scholarship surrounding Dual Language Immersion Programs in the United States. On the one hand, research shows DLI programs are an important tool for equity for language learners (Feinauer & Howard, 2014; Howard & Sugarman, 2006; Lindholm-Leary, 2005; Lindholm-Leary & Hernandez, 2011). These studies argue that DLI has helped to move the conversation around language education from a "deficit" to an "asset-based" orientation, affirming that a student's background knowledge adds value to their current learning (Nieto & Bode, 2018). One view of DLI is that it is a shift from "subtractive" language education (Valenzuela, 1999) to a view that children can integrate a second language

into their linguistic repertoire and become bilingual through thoughtfully designed language instruction (Collier & Thomas, 2023). This research often points to a foundational study by Collier and Thomas (1997) that found that immigrant students who had access to their home language during the school day learned English as an additional language more effectively than those who participated in traditional English as a Second Language program instruction. Another important area of research concerns power, race, ethnicity, and privilege surrounding DLI programs (Cervantes-Soon et al., 2017; Chaparro, 2020a; Dorner, 2011; Nuruddin, 2023; Palmer et al., 2014). These studies take a critical view, considering teacher background and training (Valdés, 2002), parent positions (Olivos & Lucero, 2020), and language use within schools (Potowski, 2005).

Student Outcomes: Justifying DLI Through Testing

Abundant research has been focused on student outcomes in Spanish-English dual language immersion programs. This area of scholarship measures academic and cognitive benefits of students in DLI programs, such as Kalia and colleagues' 2019 study that finds that dual language learners have increased executive function over monolingual students. Research indicates that students who participate in DLI programs fare the same or better than their English-only peers on standardized tests (Lindholm-Leary & Genesee, 2014). Wartzinger-Tharp and colleagues (2018) concluded that DLI students who received math instruction in a language other than English were equally or more successful on English language standardized math tests as their peers who received math instruction in English. Tran and colleagues (2015) found that otherwise "disadvantaged" students (receiving subsidized lunch, with limited English proficiency) outperformed monolingual peers on English-only standardized tests in English and science after participating in dual language immersion math and science classes where the

instruction was in Spanish. In a 2017 longitudinal summary of their thirty-two years of research about DLI outcomes for students, Collier and Thomas claim that educating multilingual learners in their first language while adding a second language dramatically alters the impact of socioeconomic status (in a positive way) as opposed to placing them in a monolingual English environment. Despite these intriguing statistics, Tedick and Lyster (2020) advised against marketing DLI programs based on achievement data, especially since most studies look only at English-language standardized tests; they instead encourage an intercultural competence and equity-focused vision of DLI programs.

Valdés (1997) warned that a danger of DLI programs is moving from valuing to commodifying another language and culture. Cervantes-Soon (2014) further explored the appropriation of the language and culture of minoritized groups for the goals of a privileged middle class in DLI programs. Focusing on testing, particularly in English, foments the notion that DLI is designed to improve outcomes for English-speaking students (Palmer et al., 2015). The current study takes seriously these concerns but is differently focused by emphasizing the DLI teachers' experience of the classroom rather than centering the perceptions of parents, students, or researchers.

Family Experience: Different According to Ethnicity

Family experience of DLI has primarily been studied along ethnic demarcations. Studies about the experiences of families whose children participate in Spanish-English DLI programs (e.g., Chaparro, 2020a; Nuruddin, 2023) show that parents of different language backgrounds choose DLI for different reasons, have very different understandings of the purposes and methods of the programs, and are treated differently by school officials. Chaparro (2020a) points out that though the language of "choice" and "selection" is associated with DLI

programs, choice is often only available to white, middle class families, for whom electing to send their children to a DLI program is one among multiple options, including private institutions. Latin@ parents, on whose cultural and linguistic heritage capital the 50/50 DLI model depends (Bourdieu, 1986; Lareau, 2002), may not have the option of sending their students anywhere other than the neighborhood zoned school. White and Latin@ parents, therefore, sometimes have different attitudes toward the same school, with white parents feeling that they are "helping" by choosing to attend, and Latin@ families feeling that they have no choice other than to attend (Chaparro 2020a, p. 50). This is in line with Posey's (2012) and Brantlinger's (2003) analyses of white parent interactions with other cultural iterations in urban school contexts.

Quantitative (Parkes, 2008) and qualitative (López, 2013) studies asked parents what their primary and secondary motivations were in enrolling their students in DLI programs in Oregon and Texas, respectively. In both cases, the primary reason for all parents was the same: increased communication and opportunities for their children in two languages. In both studies, the secondary reason was different according to home language. Spanish-speaking families and their goals are the focus of Dorner's (2011) study: she found that parents in Illinois were concerned about their children not learning English quickly enough but were reluctant to voice their feelings. Olivos and Lucero (2020) used their own research to problematize the statistics that show generally satisfied Spanish-language parents in DLI programs in Oregon and higher levels of complaints from English-language parents. The Latin@ parent satisfaction with DLI programs is especially important if we consider the "emotional intelligence capital" proposed by Guzmán and colleagues (2021). This notion assumes that feelings are communicated within a family, and that this knowledge is an important part of how families relate to one another. A

sense of being valued within a school community for one's culture (and not despite it) is a powerful feeling of belonging, and one that would be transmitted among family members. This scholarship adds to theoretical research about cultural wealth (Yosso, 2005) that Latin@ families bring to school systems (Guzmán et al., 2021). A very important consideration is the value that is ascribed to the Spanish-speaking families in a Spanish/English DLI program. Hispanic families' culture and language are crucial in order for the DLI program to function, and Spanish-speaking families' participation is necessary for the program to continue. These differences in family concerns, knowledge, and treatment call for honest, bilingual, and culturally-sensitive conversations.

Research on Spanish/DLI Teachers

A major challenge for DLI programs in the United States is finding and retaining staff. This is due to several factors, including the lack of clearly established national criteria for training and hiring DLI teachers in the United States, the need for DLI teachers to have language proficiency and cultural competence (which might require international field experience), and an existing teacher shortage (Hernández et al., 2022; Hood, 2020). In the studies cited below, one refers to "bilingual teachers" teaching in English and Spanish. Although these studies do specifically use a DLI context, I include them in the discussion because they are conscious of Anzaldúa's theoretical framework in their analyses of bilingual elementary school teachers.

Two studies (Prieto, 2013; Venegas-Weber, 2018) used Anzaldúan language to look at the "in-between" identities of bilingual teachers. Both of these studies provide a framework for research that disrupts binaries: English AND Spanish, arts AND science, personal AND professional, traditional AND feminist, community AND agency, critically AND joyfully. A third, more recent phenomenological study (Navarro Martell, 2022) points to the importance of

the Critically Conscious Dual Language Science Teacher herself, and the importance of building trust within the community that is served by the DLI program. My study resonates with Navarro Martell's methodological approach and findings but focuses inquiry more on teachers' experience in the DLI science classroom.

Linda Prieto (2013) developed a framework for female bilingual elementary school teachers' experience based on Chicana Feminist Epistemology (CFE), an alternative theoretical grounding with poetry as a central feature of its methodology (Anzaldúa, 2012; Keating & González-López, 2011). CFE places itself within the context of education research and considers *Coyolxauhqui*, meaning "healing through words"—narrative, poetry, use of multiple languages—to be an integral component of how Chicana Feminists make sense of and express their experience (Anzaldúa, 2015; Calderón et al., 2012). CFE rejects the distinctions between the university and the community (Córdova, 2002), and disrupting hierarchical, positivist, colonialist research structures is a key objective (Córdova, 2005). The distinct features of community-based epistemologies that develop out of CFE include researchers and Latin@ academics prioritizing the well-being of communities (Córdova, 2005, 2017) as well as "joyfully" embracing "agency" and the "urgency and usefulness" of their work as change-makers (Córdova, 2005, p. 229). CFE also includes the use of bilingual and translanguaged data and voices to reflect educational reality (Bernal, 1998), straddling "multiple and conflicting worlds" (Cervantes-Soon & Carillo, 2016, p. 289), and valuing "cultural intuition" (Calderón et al., 2012, p. 515). Many of these features are present in Prieto's 2013 study of ten bilingual teachers in Texas. The research methodology is the collection of *testimonios*—first person, critical narratives by *maestras* (primary school teachers). Prieto uses Anzaldúa's early term "*mestiza* consciousness" and emphasizes the hybridity of bilingual female teacher identities, the

interconnectedness of the bilingual educator with the community, and *compromiso*, embodied ethical commitment to the world beyond herself. "Critical *compromiso*" allows the bilingual *maestra* an opportunity to reflect critically on inherited community values and reevaluate her position within a society that may not be welcoming to feminist consciousness. CFE is relevant to this study due to its orientation toward cultural, linguistic, and disciplinary "in-between"' identities of female Spanish teachers in a DLI context. Women who identify as Hispanic, Chicana, or Latina have incorporated poetic inquiry into research, whether as academics reflecting on their experience (Ochoa, 2022), as researchers collecting data (Chaparro, 2020b), or both (Jiménez, 2005). Integrating poetry into a study of Spanish *maestras* who work across disciplines fits within what Anzaldúa calls the *mestiza* consciousness of Nepantleras (Anzaldúa, 2012, 2015).

Venegas-Weber (2018) applied Anzaldúa's *nepantla* notion of "in-betweenness" to bilingual DLI educators in the United States Midwest. The practice of "pedagogical noticing" provided an opportunity to witness these teachers' willingness to exist within disciplinarily ambiguous spaces, perhaps as a result of their own in-between identities. This served as a basis for Venegas-Weber to encourage teachers to claim their "*nepantla* identities"—to use both languages (English and Spanish) within educational spaces that were typically linguistically distinct, defining themselves as transcultural within their professional as well as their personal identities. This study expands on the themes of the value of in-betweenness and pedagogical noticing in relation to the manifold possibilities for surpluses of meaning in the DLI classroom.

Navarro Martell (2022) designed a phenomenological study in order to understand the phenomenon of teaching science in Spanish-English DLI classrooms within the context of the Next Generation Science Standards (NGSS). Her goals were two-fold: to gain knowledge about

the development of Critically Conscious Dual Language Science Teachers (CCDLST) and to give bilingual teachers an opportunity to reflect on and share their experiences. Her study is one of three phenomenological studies of DLI science teachers. Morell and colleagues (2019) highlighted the difficulty of the teacher in teaching middle school science in Spanish; the context of Cammarata and Tedick's (2012) study was French immersion schooling. I was especially interested in Navarro Martell's engagement with the Spanish teacher's language and culture as an asset for my study design.

For the purposes of my study, the role of the teacher in the research process and her voice in communicating her experience is especially important because I wanted to learn more about the Spanish DLI science classroom from the teacher's perspective. I was also very interested in the phenomenological emphasis on pedagogical research (van Manen, 2016). Because I was entangled within the research site as a co-worker, co-teacher, co-planner, and Graduate Assistant, I was involved in relationships of care with the teachers and genuinely wished to help them improve their teaching, planning, and assessment practices. The use of Anzaldúan terminology, the ontology of interconnectedness, an openness to bilingualism or translanguaging, and use of first-person reflections were ways in which studies by Prieto (2013), Venegas-Weber (2018), and Navarro Martel (2020) stood out to me as research models.

Theatre as Embodied Sense-Making in the DLI Spanish Science Classroom

Searching for studies about applied theatre in bilingual elementary school science classrooms is, admittedly, a very specific goal. However, there are studies that have integrated theatre in various disciplines, including science classes, and some of these studies have focused on teachers' experiences. In addition, theatre has been used in language learning contexts, with

learners and instructors, and has been the subject of theoretical work, practical guides, and empirical research.

Varelas and colleagues (2010) argue that drama is a legitimate form of scientific modeling, though it is used less often than other means used to describe phenomena. They make the case that students acting out scientific knowledge creates a "visual narrative of a phenomenon" (p. 305) that is even more compelling than other forms of modeling because it is dialogical. The actor is actively seeking to engage with the group. In the creation of a visual narrative, communication is the goal, not grammar or vocabulary (Paul, 2015). The actor creates meaning by adding their lived experience through their embodiment of the phenomenon (Varelas et al., 2010). For example, an actor may embody wind, but they necessarily embody wind with an imprint of their own experience. The group may need to follow up, collaborate, or question the actor in order to understand the phenomenon that is being represented. Perhaps, in this example, wind is not loud and violent in Mary's experience, and she is confused by Josef's howling and stomping as he embodies a *mistral* wind. According to Paul (2015), these dialogic interactions succeed in breaking down barriers between performers and audience and between teachers and students within a language learning environment; the entire group engages in communication about the phenomenon. Spolin (1999) argues that teachers and students work best together when they have a collaborative relationship, and the teacher is not so much a leveler of critiques and more the person who diagnoses the mood of the room and sets the pace of the games. This study builds on these prior studies and is distinct in focusing on teachers' understandings of the classroom experience.

Empirical studies about drama in educational settings have shown positive results in teacher and student engagement. Cawthon and colleagues (2011) measured student participation

in middle school language-arts lessons using qualitative and quantitative methods. This study saw a 30% increase in student participation when teachers employed drama-based instruction strategies. The qualitative descriptors included increased student interaction with their classmates and student performances in front of their peers. My study has similar findings but focuses on elementary DLI students in a Spanish science class.

A 2018 study by Garrett and colleagues followed teachers in Australia who piloted a Creative and Body-Based Learning (CBL) unit in elementary mathematics classes. They were excited by the results they saw in their students and energized in their own assessment and teaching practices. The five teachers incorporated drama differently; for example, one used theatre warm-up activities before math exercises, one had the students work collaboratively to build physical geometric shapes, and another had students solve equations by role-playing real-world word problems. All reported feeling that adding embodied theatre activities to their math classes was worthwhile. One teacher said, “it’s not an extra thing to place on a teaching program, it’s just something to embed into the teaching program” (p. 16). In addition to engaging joyfully with the math and with each other, students were using disciplinary mathematical language to describe what they were doing with their bodies as they acted out math problems or embodied shapes.

Theatre has been used across linguistic and cultural boundaries, within language learning classrooms (Cahnmann-Taylor & McGovern, 2020), and among language teachers (Cahnmann-Taylor & Souto-Manning, 2010). A three-year study in Georgia (Cahnmann et al., 2005, 2009; Rymes et al., 2008) examined the use of theatre activities among bilingual educators as a means of processing experiences of power differences at work. The narratives and analyses illustrate some of the issues at play in the lives of a bilingual educator: race, class, gender, accent, and

professional qualifications (designation as teacher, professor, paraprofessional, etc.). Activities from Boal's *Theatre of the Oppressed* provided an opportunity for a group of educators and students to play, replay, evaluate, and reimagine scenarios. Performers were enabled to see beyond their roles and establish distance, perspective, humor, and compassion as they considered new possibilities for the interactions they represented (Boal, 2014).

Theatre has been applied in varied educational contexts with success. Drama-based instruction has led to increased engagement with classroom activities by both teachers and students (Garrett et al., 2019). Classroom dynamics are affected as a result of theatre games (Cahnmann-Taylor & McGovern, 2020; Cahnmann-Taylor & Souto-Manning, 2010). Teachers of language arts (Cawthon et al., 2011), mathematics (Garrett et al., 2019), science (Varelas et al., 2010), and additional languages report feeling happy with incorporating drama-based techniques as tools for instruction, assessment, team building, and self-understanding (Rymes et al., 2008). In addition to the affective component, there is an increase in learning, as evidenced by disciplinary language use and performance of target skills. Finally, the teachers themselves report positive outcomes associated with theatre's ability to provide therapeutic reflections, a chance to reinvigorate their teacher toolbox, or opportunities for fun. My study confirms these findings and is unique in that the teachers are provided with additional opportunities to use artistic methods to reflect on their experiences of incorporating drama in the Spanish science classroom through photo-elicitation and poetry.

Engaging DLI Students in Science at OES

Older teachers and learners may recall using science textbooks in K-12 settings. This is increasingly unusual, with digital resources taking the place of printed books in elementary schools at CSD. However, in some cases, there are no available resources for science instruction,

which leads to an increased amount of pressure on teachers. According to Haas and colleagues (2021), local school districts and teachers are often "expected to design or adapt instructional materials for an increasingly diverse student population" (p. 735) because there is a dearth of materials that meet the criteria established by NGSS.

Georgia is one of the states that adopted the NGSS. CSD opted not to select a science textbook for elementary schools, focusing instead on the Science Georgia Standards of Excellence, which are process-oriented. The CSD offers a curriculum map in English that outlines the science units for each grade level, with each unit anchored in phenomena. The CSD curriculum portal describes the tasks of district science teachers as follows:

> Science teachers will use phenomena (real-world objects and events) to engage students in three-dimensional learning; integrate core ideas, science and engineering practices, and crosscutting concepts into instruction; and use the science and engineering practices to actively engage students in the learning process. Classroom instruction should be hands-on, student-centered, and inquiry-based. (Beall, 2021)

According to this document, the goal is for teachers at CSD to be facilitators of science knowledge rather than primarily authoritative sources that communicate canonical scientific facts. To accomplish this, teachers first ensure that students engage with the phenomena, then structure lessons that invite students to employ scientific practices, concepts, and ideas around the anchoring phenomena. For example, a third grade lesson about thermal transfer will invite students to share their knowledge of sources of heat and then provide opportunities to observe and predict heat transfer in everyday circumstances. This means that the teacher must gather information and material from a variety of sources to prepare the lesson and to curate material for students about the phenomenon. These may be online videos, experiments, engineering challenges, stories, or other tasks. DLI science teachers at OES need to find Spanish-language

online resources that support a lesson or translate English resources that other teachers create themselves in their grade level planning.

The structural realities of a DLI 50/50 classroom are such that half of the students are language learners at any given time. At OES, English is the lingua franca among students when socializing, which is not uncommon in DLI programs (Potowski, 2005; Thomas & Collier, 2012). Additionally, at OES, science has been taught in English in past years in the DLI program. This combination of factors meant that OES Spanish teachers had students arriving in their science classrooms in August 2023, ready to employ English disciplinary vocabulary. The teachers also had Spanish-speaking students who were new arrivals to the school and the district and who had various levels of formal education in their home countries.

Language teachers might recommend various methods to encourage "Spanish only" in a DLI classroom. Some instructors could refuse to accept answers in English or pretend that they do not understand students when spoken to in English. Others might require the use of a set vocabulary list in the target language in responses. Each of these strategies puts the onus on the speaker and emphasizes Spanish literacy and oracy as a prerequisite for class participation.

In contrast, this project aims to use drama as a means of expanding participation in dual language immersion classroom science without Spanish language proficiency being a requirement. As such, it is indebted to past studies about dual language/bilingual education, science education, and arts integration. Quantitative research has established that emergent bilinguals make up a growing percentage of the K-12 schooling population of the United States (Irwin et al., 2022). Consequently, the current study about integrating students with various linguistic abilities and cultural backgrounds into K-12 science discourse is relevant and widely applicable outside of DLI contexts.

From this review of current literature the most relevant information is the following:

1. DLI is a rich area of research. Students and teachers have cultural and linguistic identities that interact with their disciplinary knowledge. More research should be done about teacher experience in DLI. My study contributes to the research into teacher experience.
2. Science teaching and learning has changed in significant ways in the last ten years as a result of the NGSS. This has important implications for teachers of language learners, including DLI teachers. The current study explores some of these implications, especially in relation to teachers' experience.
3. Applied theatre and other arts-based pedagogies have been used in language-learning and science classrooms in ways that are meaningful to students and teachers. This study supports this finding by showing that disciplinary language acquisition and use is increased in Spanish science classes.

CHAPTER 2

RESEARCH METHODS AND STUDY DESIGN

Introduction

Three DLI Spanish teachers incorporating theatre arts standards in their science classes serve as the subject of this dissertation. The study took place at OES during the Fall of 2023. This chapter discusses the methodological orientation in terms of phenomenology and describes how poetic inquiry details the choices that went into creating and conducting a phenomenological research study to answer questions about the experience of those DLI teachers.

Methodological Framework

Methodological Orientation

This study integrates hermeneutic phenomenology with poetic inquiry. Both phenomenology and poetic inquiry are research methods that prioritize aesthetics (Freeman, 2021), language (Heidegger, 1971; Gadamer, 1960), and the experiences of the researcher and the research participants (Brady, 2009; van Manen, 2016). This study employed hermeneutic phenomenological methods of gathering, organizing, and interpreting data. Poetic inquiry was incorporated into the data collection, analysis, and communication. According to Davey (2005), phenomenology and aesthetics both speak to "in-betweenness" (p. 140) that cannot be known strictly through rhetoric: experience demands poetic language. Galvin and Todres (2009) describe the need for the researcher to develop poetic skill to "enter into the aliveness" of the experience of the research in order to represent it to the reader with complexity and feeling (p. 309).

This study was primarily grounded in phenomenology as a methodology. The arts have an important place in phenomenological research (Visse et al., 2019) and, following the tradition of integrating artful methods into the data collection and analysis, photography and poetic inquiry were incorporated into this study design.

"Arts-based" and "phenomenon" are important terms in the method and subject of this project. To clarify, it is helpful to separate the researcher from the teacher. In this study, the teacher used theatre arts standards ("arts-based" pedagogies) in her DLI classroom as she taught phenomenon-based science lessons in Spanish. The researcher used poetic inquiry (arts-based research) alongside phenomenological methods to gather and reflect on data from the teachers and students.

Hermeneutic (Interpretative) Phenomenology

There are two primary schools of phenomenological thought and certain research methodologies that align with each. Transcendental (Descriptive) Phenomenology, following Husserl (1980) and Moustakas (1994), embraces a method designed to reveal the phenomenon as experienced by the perceiver (Hanauer, 2010) by bracketing out all of the researcher's preconceived notions through a rigorous practice known as the Phenomenological Reduction (Moustakas, 1994). Hermeneutic (Interpretive) Phenomenology follows Heidegger (1971) and assumes description of phenomena will include the researcher's interpretive lens. A human sciences researcher using Hermeneutic Phenomenology must be very aware of their biases and personal understandings of the phenomenon at the outset and continually revisit and reevaluate them, in a process known as the Hermeneutic Circle, even as they work to understand a phenomenon (Peoples, 2021, p. 33).

Hans-Georg Gadamer (1900–2002) continued the hermeneutic tradition, emphasizing the importance of language in shaping relationships and experience (2013). It is through language that Gadamer establishes the relationship with "the other" through dialogue (Green et al., 2021, p. 3). This relationship through dialogue is in line with van Manen's (2016) understanding of phenomenological research involving an ethical imperative of responsibility to the other.

Hermeneutic phenomenological inquiry centers on language and, in so doing, establishes itself as a "poetizing activity" (van Manen, 2016, p. 13). Because description and interpretation rely on language that is culture-bound and limited, it is the task of the researcher to illuminate the experience through evocative speech that captures the imagination of the listener.

The hermeneutic phenomenologist Maurice Merleau-Ponty (1983) emphasizes that language itself has actancy (p. 18). The use of language requires an understanding of its own "'situatedness"' within disciplinary discourse and the researcher's own part within the Hermeneutic Circle as speaker, interpreter, and communicator. Brady (2009) uses the image of a see-saw to describe the dialogic balance of language and research in hermeneutic phenomenology. The researcher in this analogy is no detached observer; rather, she is a participant who is negotiating equilibrium. The researcher is a part of the Hermeneutic Circle: the observer is part of the observed. There cannot be a hard line between the theory and practice of observer and observed because of the interdependence of the ecosystem that is phenomenological research. This connectedness of the researcher to the subject matter through language brings with it an ethical imperative: the researcher has a heightened responsibility resulting from the relationship engendered by shared experience of the phenomenon conveyed through language.

This study is situated within the tradition of hermeneutic phenomenological research, a qualitative methodology that is philosophical, reflective, and personal for the researcher. The researcher's positionality is important to the research process and begins with the selection of a topic that is personally relevant (van Manen, 2016). Her positionality is acknowledged and revisited throughout the process (Peoples, 2021). Van Manen (2016) states that, after selecting the topic, the phenomenological researcher must engage in six activities. Table 1 lists these six activities and how they were enacted in this study.

Table 1. van Manen's Research Activities vis-à-vis This Study Design

1. The researcher must choose a phenomenon that is personally meaningful.	Phenomenon: Making science content meaningful and accessible to language learners.
2. The researcher must pay attention to the phenomenon as it is in the world.	Spanish DLI teachers at OES are teaching science in a school setting with real complications: schedule changes, newcomer students midyear, language learners at various levels.
3. The researcher must be reflective: what is the nature of the experience of the phenomenon?	Philosophical and artistic reflection with teachers and students.
4. The researcher must describe the processes through writing. Language is important in phenomenological research.	Writing descriptions of the events, game procedures, teachers' photo reflections, anecdotes, poems.
5. The researcher must profoundly engage with the subject. The researcher has an ethical imperative to learn more about the subject.	I wish to learn more about science! I wish to bring more science engagement to OES.
6. The researcher must seek to connect the area of research with the "big picture" and with "being in the world": how does this phenomenon relate to the world beyond?	Can philosophical ideas of enchantment, assemblage, and *nepantla* translate into elementary school classrooms? How? How does this impact all students struggling with science content?

	How does this impact all teachers? What contributions can be made toward environmental care?

Seidman (2019) suggested a three-interview protocol for phenomenological research. The first interview is a chance to learn about some generalities of the life of the interviewee in a "Focused Life History" (p. 21). While the interview can include broad subjects, the questions are connected to the phenomenon at hand. The purpose is to contextualize the experience of the phenomenon. The second interview is a more focused look at a particular experience (p. 22). This interview seeks to reconstruct a particular event, and in so doing, discover details and insights that can be built upon in the third interview. The third interview is a reflective interview in which the interviewer asks the participant to consider the significance of the particular event described in Interview 2 in the broader context of Interview 1 (p. 23).

This study modified Seidman's recommendations slightly. Originally, three interviews were scheduled to coincide with Seidman's tasks, and arts-based research components were added to each interview agenda (Table 2). In November 2023, after completing three interviews with each participant, I chose to 'add a fourth interview with some follow-up questions. This additional interview was in line with Singh's (2022) suggestion that one task of the phenomenological interviewer is to revisit whether the participant had enough opportunities to fully share their experience.

Table 2. Seidman's Interview Recommendations vis-à-vis This Study Design

Seidman	Dubberly Modification
Interview 1: Focused Life History Phenomenon is put in the context of interviewee biography.	Interview 1: No modification
Interview 2: Reliving a Specific Event	Interview 2: Reliving a classroom science planning/teaching activity through Photo Elicitation

Interview 3: Reflection on the Meaning	Interview 3: Reflecting with poetic inquiry: review transcripts, invitation to follow poem prompts
	Interview 4: Follow-up questions

Poetic Inquiry

Poetic inquiry is the use of poetry in the gathering, analysis, or reporting of research data in qualitative research. Also previously known as "research poetry" (Faulkner, 2020, p. 12) or "lyric inquiry" (Neilsen, 2008, p. 94), poetic inquiry is an "aesthetic social science" (Richardson, 1998, p. 461), "a middle worth pursuing" (Brady, 2009, p. xiii) in the borderland between social sciences and the arts. This study integrated poetic inquiry in four ways: as I analyzed data, as participants engaged with data, as data collection, and as communication about findings.

Laurel Richardson (1993) was a pioneer of using poetry in social science research, using poems to capture nuances of participant voices. In poetic inquiry rooted in the ethnographic tradition, researchers observe, take field notes, and write poetry as a reflective process about a community whose everyday lives and experiences they are closely observing (Behar, 2008; Kusserow, 2008; Richardson, 1993). Poetic ethnographers require training in anthropology and poetry, and their work is judged by disciplinary research standards as well as for its quality as art (Maynard & Cahnmann-Taylor, 2010). Autoethnography points the anthropologist's tools at the self, for example, using this method to explore their experience of belonging in a particular community, such as cancer patients (Leggo, 2021), international graduate student mothers (Zhang, 2021), and Deaf-hearing families (West, 2009), as well as to reflect on the process of work as social science researchers (Hanauer, 2010).

Poetry has long had a place in hermeneutic phenomenology. Martin Heidegger, the primary proponent of interpretive phenomenology, believed that experiencing art transforms humans. Standing in front of a painting, for example, changes a person's way of being by

"deconcealing" something about Truth (1971, p. 39): the artwork reveals something to the viewer. Being open to the possibility of that revelation is ascribing indeterminacy to the other (in this case, the painting). Heidegger links phenomenology to poetic inquiry: phenomenologist/poets are interested in what is known and in being truthful about what is not known. In the essay "What Are Poets For?" Heidegger asserts that poets "learn what is unspoken," even though this form of scholarship may not be not taken seriously and is considered an "unscientific violation," as Heidegger puts it; the poet persists because the "long way leading to the poetry is itself one that inquires poetically" (1971, p. 96). Hans-Georg Gadamer (1986), following Heidegger in the hermeneutic phenomenological tradition, points to the importance of poetic language's ability to reveal truth about experience.

Bringing Hermeneutic Phenomenology and Poetic Inquiry Together

Poetic inquiry has been integrated with hermeneutic phenomenological research in a variety of research contexts (Bacon, 2018; Howard, 2012; Todres & Galvin, 2008). According to Green and colleagues (2021), using poetry as a means of gathering, organizing, and expressing data within a phenomenological study is a natural fit. They argue that a hermeneutic disposition shines through poetic inquiry: in the willingness to hear the voice of the other, in the acknowledgment of indeterminacy, and in an attitude of curiosity and willingness to be changed. Freeman (2017) approaches poetic inquiry epistemologically, arguing that knowledge about experience can be accessed in a different way through poetry. Van Manen and van Manen (2021) cite the extensive tradition of incorporating poetry in phenomenological research, and the use of aesthetic language to communicate the essence of singular experiences.

Les Todres and Kathleen Galvin (2008) provide a framework for what they call "aesthetic phenomenology" and "embodied interpretation" (p. 568). This form of poetic inquiry

was the most important to the development of this study. Their aesthetic phenomenology seeks to use language poetically to communicate research findings as an "experience of homecoming for others" (p. 574). The crucial element of "embodied interpretation" is the movement away from Husserl's precise, mathematical understanding of language to a Gadamerian understanding of language, where the truth of the "text" that is the conversation belongs neither to the speaker nor the hearer, but is an object in itself (Gadamer, 1960, p. 404). Todres and Galvin invoke Eugene Gendlin, a Gadamerian psychotherapist who understood that the words of the speaker are mediated through the body of the listener. In a separate publication, Galvin and Todres (2009) note that words cannot always express the fullness of another's experience, and so they apply Gendlin's technique of "felt sense" from the realm of therapeutic practice to that of research (p. 310). This involves engaging with the other in a way that goes beyond the cerebral, that "requires the faculty of the whole body: its senses, feelings, what's gone before, sense of possibilities, all that announces itself before we package experience into categories" (Galvin & Todres, 2009, p. 310). The embodiment involves "holding" the experience of the other in the body of the listener/researcher and then seeking the language to expand the reach of the experience. Todres and Galvin assert that phenomenological understanding of experience is an alchemy of other + language + self + language that calls upon the poetic imagination of the researcher (2008). "Self" necessarily includes the full humanity of the researcher as socially and bodily engaged with others, rather than as an isolated individual.

In this study, phenomenological interviews and poetic inquiry methods provided the framework for encounters between the three teachers and me, the researcher. Educational philosopher Maxine Greene (1994), saw educational research as a tool for social change. She was delighted by the idea that "new" research methods—"postmodernism, poststructuralism,

hermeneutics, feminism, multiculturalism, and literary criticism" (p. 426)—would be employed in pedagogical inquiry and, as a result, educators' attention would be brought to students that perhaps had been overlooked. She called upon researchers to move past the binaries of "the quantitative and the qualitative, the objective and the purportedly subjective" and hoped that "educational researchers might turn to metaphor and the imagination to the end of recasting old oppositions and, perhaps, to link theory and experience together in new and dynamic ways" (p. 457) to construct playful, beautiful, ethical societies. In order to do that, educators need to encourage dialogue and encounters between people who strive to understand one another (p. 459). The design of this study took into account the long days of teachers, especially the hard work of switching between two languages for DLI teachers. It also considered Greene's call for researchers to incorporate theory and experience in new ways and van Manen's (2016) declaration that phenomenological research must be a moral project in which the participants develop a greater understanding of themselves. By turning to metaphor and imagination, poetry, photography, and phenomenological questions, the goal was for our shared research to include space for generous indeterminacy, where teachers could reveal their experiences and we could learn together in a way that was joyful, affirming, and authentic.

Research Purpose and Questions

The purpose of this research project was to learn about the qualities of the experience of DLI teachers using arts-based pedagogies to teach Science in Spanish. This qualitative study is guided by the following research questions:

RQ1: What are the qualities of the experience of teachers who use arts-based pedagogies in DLI Science class?

RQ2: What linguistic, cultural and artistic resources are employed by teachers who use arts-based methods to teach Science in a DLI class?

RQ 3: What entanglements exist within the DLI Science classroom as a research site?

Table 3. Research Questions and Data Sources

Research Question	Data Source	Related Questions
RQ1:What are the qualities of the experience of teachers who use arts-based pedagogies in DLI science class?	1. Interviews Note: Each teacher was interviewed individually 4 times. a. Interview 1 (initial interview) b. Interview 2 (photo-elicitation interview) c. Interview 3 (poetic inquiry interview) d. Interview 4 2. Close observation 3. Anecdotes	How does a teacher's situation (country of origin, age, education, family, years of teaching) impact her experience of or interest in integrating the arts into the DLI science classroom?
RQ2: What linguistic, cultural, and artistic resources are employed by teachers who use arts-based methods to teach science in a DLI class?	1. Interviews Note: Each teacher was interviewed individually 4 times. a. Interview 1 (initial interview) b. Interview 2 (photo-elicitation interview) c. Interview 3 (poetic inquiry interview) d. Interview 4 2. Close observation 3. Anecdotes	How do DLI teachers integrate arts-based activities into their Science classrooms?
RQ3: What are the human and material entanglements in a DLI science classroom as a research site?	1. Interviews Note: Each teacher was interviewed individually 4 times. a. Interview 1	What materials are used in art-making? How do these interact in classroom spaces?

	(initial interview) b. Interview 2 (photo-elicitation interview) c. Interview 3 (poetic inquiry interview) d. Interview 4 2. Close observation 3. Anecdotes	How do the different materials and creative activities affect bilingual elementary school teachers' experience? What relational dynamics exist between the teacher and researcher? What roles do each have, how are these established, and how are they maintained?

Study Context

The site of this study is Otis Elementary School (OES), part of the Charrua School District (CSD), a Title I public school district in the Southeastern United States. OES has housed the only DLI program in CSD as a strand within the school since 2016. Enrollment in the DLI program is limited to those students that live within the boundaries of the OES residential zone. There is a total enrollment of 560 students in PK–5th grade at OES, of which 290 students are in the DLI program. In the DLI PK class, the Spanish/English model for instruction is 70/30. In K–5th grade, the DLI program follows the 50/50 model. Currently, there is a wait-list for PK and K, the only classes that accept students from English-speaking households. In 1st through 5th grade, students who transfer into the OES zone from another DLI school or from a Spanish-speaking country are eligible to enroll in the DLI program if there is space in the grade level. After Kindergarten, students who primarily speak English at home are not eligible to enter the DLI program unless they are transferring from another DLI school outside of CSD.

While 33% of the OES student population is Hispanic, the Spanish-speaking community in suburban north Georgia is relatively recent development. Between 2000 and 2010, the Hispanic population in the South grew at a much higher rate than any other demographic group; more than half of the Spanish-speakers were recent arrivals from Mexico (Cervantes-Soon, 2014). The small city in Georgia where this study takes place is part of the "New Latino

Diaspora" (Murillo & Villenas, 1997), where Spanish-speaking or Latino immigrants have made their homes in areas of the United States where there was not historically a Hispanic population. Cervantes-Soon (2014) notes the neoliberal roots of the "New Latin@ Diaspora" as well as the emphasis on language learning as a possible tool for business success in some DLI programs.

Some support for the DLI program has come from a partnership between the CSD and the University of Georgia (UGA). From 2016–2020, UGA placed a Professor in Residence at OES to assist with developing materials and training staff. In addition, since 2016, there has been at least one graduate student working at OES as a Graduate Assistant. Since 2020, CSD has sponsored a 20-hour-per-week grant that supports a UGA project to "Implement and Evaluate the DLI Program at OES." Since 2021, I have been the only Graduate Assistant assigned to this position.

At OES, DLI students receive math, science, and Spanish language arts in Spanish. Math and science assessment occurs in English at the school-, district-, and state-wide level for all students, including DLI students who receive math and science instruction in Spanish. English DLI teachers provide instruction in social studies and English language arts. Non-DLI classes have allotted science/social studies time in their classroom instruction schedules. DLI classes do not.

Participants

There were three teacher participants in this study. Following Alase's (2017) recommendation for a small sample size of participants for phenomenological study, my goal at the outset of the study was to find three to four Spanish DLI teachers to participate in my study. I hoped that with that number of participants, I could gather data from people with varied experiences and backgrounds.

Participants in this study were Spanish DLI teachers in the DLI program at OES. Selection was based on teacher interest as demonstrated by responding to a scripted announcement (Appendix A) and returning a consent form (Appendix B). During the 2023–24 school year, the DLI staff at OES included six full time DLI Spanish teachers, one teacher who taught in both English and Spanish, six DLI English teachers, and four DLI parapros.

Participant Eligibility

In July 2023, I identified seven teachers who would be teaching science in Spanish during the 2023–2024 school year (Table 3). At that time, the DLI teachers at OES publicly self-identified as female with she/her pronouns. They ranged in age from their early twenties to 69 years. Georgia law requires that each school publicize the certification status and years of teaching experience of homeroom teachers. In addition, the DLI teachers also shared information publicly about their past experience as bilingual teachers and learners around the world. Through national origin, citizenship, teaching experience, or kinship, DLI Spanish teachers at OES had ties to the following Spanish-speaking countries: Peru, Colombia, Bolivia, Ecuador, Costa Rica, Guatemala, Puerto Rico, Mexico, and the Dominican Republic. Table 3 shows publicly available information about Spanish DLI teachers at OES; Table 4 shows information gathered through this study. Of the total DLI staff, seven (the Spanish teachers) were eligible for this study.

Participant Recruitment

In keeping with the IRB and CSD guidelines, I made three attempts to contact teachers. The first invitation to participate was a scripted announcement (Appendix A) I read at the first DLI staff meeting on July 30, 2023. The meeting included the seven eligible Spanish teachers, five ineligible English DLI teachers, four parapros, and the English-speaking DLI coordinator at OES. The second invitation was issued via a print-out of the same scripted message stapled to

the Teacher Consent Form (Appendix B). These invitations were placed in the mailboxes of the seven eligible teachers in the OES Teacher Workroom on August 2, 2023. Four teachers responded to the invitation to take part in the study. Upon reading the consent form and asking follow up questions, one teacher determined that she did not want to pursue participation, citing time concerns. By August 31, 2023, three teachers had committed to participate in the study. The third communication inviting participation was sent via email to the OES DLI Listserv on September 16, 2023. This email included the same scripted message and Teacher Consent Form. Two teachers who were already enrolled in the study responded to the email. Two additional teachers indicated interest in joining the study in passing but did not follow up with consent forms.

Data Collection and Analysis

Data for this study was collected in accordance with guidelines set forth by the Institutional Review Board (IRB) at the University of Georgia and the Office of Data and Research at the Charrua School District (CSD). Approval from the IRB and subsequent approval from CSD for research at OES was granted in October, 2022. This study began in August, 2023.

Data Collection

Data was collected following recommendations of Van Manen (2016) for hermeneutic phenomenological research: close observation (p. 68), interview (pp. 66, 98) and the use of visual artifacts (p. 74). Following the strong tradition of incorporating the arts into phenomenological research (Freeman, 2016), this study integrated arts-based methods, specifically photography and poetry, into data collection. The interviews followed the three-interview format established by Seidman (2019) with some modifications to include arts

methods. A fourth interview was added in December 2023. Table 4 shows the timeline of data collection activities.

Table 4. Data Collection Timeline

Activity	Timeline
UGA IRB approval	10/17/2022–10/17/2027
CSD Research Approval	October 2022–April 2023
CSD Approval Continuation	June 2023–December 2024
Recruit participants Teacher Media Release Forms Teacher Consent Forms	August 2023
CSD Research Media Release Forms UGA Parent Consent Forms	August 2023
Teacher Interview #1	August 2023
Classroom Activities Teacher Photo-elicitation	September–November 2023
Teacher Interview #2	September–November 2023
Teacher Interview #3	November 2023
Teacher Interview #4	December 2023

Interview 1: Semi-Structured Phenomenological Interviews

Participants were recruited for the study in August, 2023. After teachers had agreed to take part in the study and signed the consent forms, I met individually with each teacher for Interview 1, a phenomenological interview. The interview was semi-structured. Following the advice of Jacob (2012) for novice qualitative researchers, I had a script and an extensive list of questions to which I could refer. See Appendix C for the list of questions. I told teachers that they could choose the time and place for the interview. All three chose to meet at school in their classrooms. Sra. Carla and I met during her planning period; Sra. Lana and I met after school; Sra. Mary and I met during her planning period.

A phenomenological interview has two important purposes (van Manen, 2016). First, it serves to establish a relationship between the interviewer and the interviewee. Secondly, it provides stories about the experience in question. Both the relationship-building and the story

collecting has as its goal the deeper understanding of the phenomenon (p. 66). In the case of this study, the broader initial question—"What is it like to be a DLI teacher using arts-based methods to teach science in Spanish?"—became more specific with each interview: "What was it like for you as a teacher when Maria acted like the wind and Ángel moved his pants to show that the wind affected him during the lesson on weather?"

Interview Recording, Sharing, and Storage Considerations

Interviews 1 and 2 for all three participants and Interview 4 for Sra. Lana were recorded on iPhone 14 voice memos. My phone has face authentication and is passcode protected for security. Interviews with Sra. Mary and Sra. Lana' were conducted in English. Sra. Carla's interviews were conducted in Spanish, translated using Google Translate, and manually edited. I used Google Translate as an initial translation step instead of relying on my Spanish for several reasons. First, Google Translate was very quick; in less than one minute there was a draft of the text in English. Secondly, because I had not spent a long time working on the document translation, I was able to read the Google Translate version of the English transcript and listen again to the Spanish recording, and both felt fresh to me. Third, I wanted to be sure that my Rioplatense Spanish and its regional idioms were not influencing the translation of an interview with someone who is, for example, Colombian. After reading the Google Translate document and listening again to the Spanish recording, I did make adjustments when Google Translate did not always make sense of the regionalisms or verbal fillers (such as *es que, este, osea* and *de manera que*) that were employed by Sra. Carla.

Interviews were transferred from my phone to Otter.ai digital files within 24 hours. They were transcribed using Otter.ai, manually edited, and saved as files with pseudonyms replacing identifying information. When I printed out and shared digital files of the transcripts, identifying

information had already been changed. The names of the teachers, students, elementary school, and social organizations all were changed.

Photo-Elicitation: Co-Planning and Co-Teaching Activities

In September 2023, the second phase of the study involved co-planning and co-teaching arts-based science lessons with participating DLI teachers. Burton and colleagues (2017) suggest that photo reflective interviews are a meaningful tool for remembering a specific event and making sense of it. With that in mind, photo elicitation was added to Seidman's (2019) recommended Interview 2 (Table 2). During the lesson creation process, I invited the teacher to take photos of our planning and teaching using her personal cell phone and to refer to these photos during the second interview (Appendix D). This photo-elicitation technique was informed by García-Vera and colleagues (2020), who suggest that photo-elicitation is a way to disrupt binaries between researcher and primary school teachers by empowering the teachers to select or create images that convey their experience. Hidalgo Standen (2021) adds that photo elicitation allows teacher-researchers to provide context to their experience and that an interviewer who shares background knowledge is able to provide her own meaningful interpretation. These photos were the basis of the post-lesson interview (Interview 2), following van Manen's support of the use of artistic texts as a "source of lived experience" (2016, p. 74). See Appendix E for the protocol for Interview 2.

During the co-planning and co-teaching process, I made close observations of the classroom events and environment using the Observation Guide (Appendix F). With the notes and sketches from that guide, I wrote a descriptive "anecdote" (van Manen, 2016) about one incident from each lesson. This anecdote was a snapshot of a moment in the lesson that was meaningful to me. I prepared the story from my perspective to share with the teacher and to ask

for her feedback about my observation during Interview 2. At that time, the teacher shared her photos and memories of the planning and teaching activity.

Photography Considerations

At OES, teachers are asked to take photos daily by the school administration. Photos are shared regularly with parents through Class Dojo, an app designed for school-family communication. Additionally, teachers are expected to upload photos to the school social media accounts and make them available for the school website and for Family Engagement newsletters. Because teachers are often photographing their classes, I felt confident that this task would not be an added burden for the teachers.

OES and CSD request permission to take photos of the children at school via media releases at the beginning of each school year. The teachers collected the general media releases for their classrooms. A list of students who cannot be photographed is available to them. In addition to the general media release, I sent home explicit parent letters advising all DLI families about my research. Families were informed that while all students would participate in classroom activities, only those students with explicit permission to participate and research media releases would be included in the research product. I collected all media and research permissions and reviewed them to ensure that images and anecdotes corresponded to students whose parents had given permission for them to participate in the study. I have been granted permission to show the work, images, and stories featured in this dissertation. All signed permission forms are stored and locked in a secure location in my home.

Interview 2: Photo Elicitation Interview

After the classroom activities were complete, each teacher and I met to discuss the teacher's photos in September 2023. This interview had as its basis the photo elicitation prompt and is known in this study as Interview 2 (Appendix E). Once again, I told teachers that they could choose the time and place for the interview. Sra. Lana chose to meet me in her classroom at dismissal time. She showed me the photos that she had selected on her Android phone and on her computer. Sra. Carla chose to meet me in her classroom after school but was uncomfortable because the room was very hot, so we relocated to another teacher's classroom. She showed me photos that she had taken on her Android phone. Sra. Mary chose to meet me on the patio of a local coffee shop when she went to solicit a gift card donation for a school fundraiser. She showed me photos that she had taken on her iPhone.

Interview 3: Poetic Inquiry

Following Tomaszewski and colleagues' (2020) suggestion for participant debriefing, I met individually with each teacher a third time in October 2023 to request feedback on accuracy of transcripts from Interviews 1 and 2. My concern for accuracy of language was informed by Smith (1996, 2015). I wanted to be sure that I had correctly heard and transcribed "the 'them' that they present to the world" (Smith, 1996, p. 53).

In preparation for Interview 3, I provided printed transcripts of the previous interviews to each teacher. The teachers were encouraged to read over the transcripts and make any changes or corrections to their statements or my transcription or translation of their words. Only Sra. Mary asked for some corrections to be made.

In my study, Interview 3 had three purposes: to ask for feedback on the transcripts, to share poem annotations, and to participate in a poem prompt activity. The poem prompts were

developed by me because I wanted to make explicit to the participants my goal of creating poetic transcriptions (Glesne, 1997). The prompts gave the teachers an opportunity to create poems using their own words and to see how I would be using the transcripts for poetic inquiry. This activity was consistent with phenomenological research in that it had a pedagogical goal (van Manen, 2016). See Appendix G for the Interview 3 protocol and Appendix H for the poem prompts.

I had asked each teacher to be available for one hour for Interview 3, which Seidman (2019) called "Reflection on the Meaning." Once again, I gave the participants choice as to place and time, but on this occasion I included an invitation to my home. Sra. Carla came to my house on a Saturday afternoon, where we spent over an hour together working on one poem prompt and reviewing the transcripts. Sra. Mary and I met after school in her classroom and worked on several poem prompts for more than two hours. Sra. Lana asked me to meet her outdoors at a local fast food restaurant; we spent less than an hour together and worked on one poem prompt.

Interview 4: Teacher's Choice Response

For the fourth interview, a printed list of written questions was provided to the teachers. These questions were developed in November and December of 2023 as I was writing and found that I had follow-up questions for all the teachers. All three teachers were told that they could answer the questions verbally or in writing, according to their preference. Each of the three teachers chose a different modality: Mary wrote her answers in longhand on the printed document, Lana asked to be recorded in a conversation format, and Carla recorded her answers and sent them via WhatsApp voice message. Lana and Carla were given access to digital documents of the transcription for their review. Mary was sent a photograph of the handwritten paper on which she wrote responses. In Carla's case, I had follow-up questions to her responses.

In the digital interview document, I added the follow-up questions and marked them with the date. The protocol for Interview 4 can be found in Appendix I.

Data Analysis

Analysis on the data was ongoing. The purpose of the analysis was to gain insight into the phenomenon of being a Spanish DLI teacher using arts-based methods to teach science. There were three types of analyses that were employed in this study: thematic analysis, assemblage analysis, and poetic analysis. Tables 5, 6, and 7 show data collection descriptions for each participant and explains which methods of analysis were applied to specific data.

Table 5. Data Collection Description: Sra. Carla

Activity	Description of Data	Analysis
Interview #1	Phenomenological interview	Thematic analysis, Poetic analysis
Co-planning: Elizabeth and Carla	Researcher notes Researcher photos	Assemblage analysis
Classroom Activities –Weather and Weather Tools 1 –Weather and Weather Tools 2 –Weather and Weather Tools 3 –Magnets 1 –Magnets 2 –Light and Sound 1 –Light and Sound 2	Researcher notes Researcher photos Teacher photos Student work	Assemblage analysis, Thematic analysis
Photo Elicitation	Researcher requests photos from teacher	Assemblage analysis, Thematic analysis
Interview #2	Phenomenological interview	Thematic analysis, Poetic analysis
Interview #3	Participant poems Researcher poems and notes	Thematic analysis, Poetic analysis,

		Data triangulation
Interview #4	Written list of questions given to Carla on December 12, 2023. Carla answered questions verbally on WhatsApp voice recordings on December 16, 2023. Elizabeth transcribed and translated voice recordings. Transcription and translation documents were shared with Carla for confirmation on December 17, 2023.	Thematic analysis

Table 6. Data Collection Description: Sra. Lana

Activity	**Description of Data**	**Analysis**
Interview #1	Phenomenological interview	Thematic analysis, Poetic analysis
Co-planning: Elizabeth and Lana	Researcher notes Researcher photos	Assemblage analysis, Thematic analysis
Classroom Activities –Patterns in Nature 1 –Patterns in Nature 2 –Patterns in Nature 3 –Changes in Matter 1 –Changes in Matter 2 –Stars and Sky 1	Researcher notes Researcher photos Teacher photos Student work	Assemblage analysis Thematic analysis
Photo Elicitation	Researcher requests photos from teacher	Assemblage analysis
Interview #2	Phenomenological interview	Thematic analysis, Assemblage analysis
Lana Carter Interview #3	Participant poems Researcher poems and notes	Thematic analysis, Poetic analysis, Data triangulation
Interview #4	Written list of questions given to Lana on December 12, 2023. Lana asked to have a spoken recorded interview. Interview took place on December 15, 2023 and was recorded on Apple Voice Memo. Elizabeth transcribed voice recording. Transcription	Thematic analysis

	document was shared with Lana for confirmation on December 16, 2023.	

Table 7. Data Collection Description: Sra. Mary

Activity	Description of Data	Analysis
Interview #1	Phenomenological interview	Thematic Analysis, Poetic analysis
Co-planning: Elizabeth and Mary	Researcher notes Researcher photos	Assemblage analysis, Thematic analysis
Classroom Activities –Weather –Solar System 1 –Solar System 2 –Solar System 3 –Sound and Light –Energy 1 –Sound and Light – Energy 2	Researcher notes Researcher photos Teacher photos Student work	Assemblage analysis, Thematic analysis
Photo Elicitation	Researcher requests photos from teacher	Assemblage analysis
Interview #2	Phenomenological interview	Thematic analysis, Poetic analysis
Interview #3	Participant Poems Collaborative poems Researcher Poems and notes Edited Transcripts Participant notes	Data triangulation, Poetic analysis, Thematic analysis
Interview #4	Written list of questions given to Mary on December 12, 2023. Mary wrote out answers and returned the document to Elizabeth on December 15, 2023.	Thematic analysis

Thematic Analysis

The first level of analysis was thematic (Braun & Clarke, 2006). I selected themes by reading and re-reading the transcripts of teacher interviews and making lists of words and themes

that appeared often. This method of thematic isolation is one of three thematic analysis options that van Manen (2016) describes: the "selective or highlighting approach" (p. 93). I searched for theme words using the "Ctrl+F" function of my Windows computer and read the sentences in which the words were used, looking for other words or themes that were connected in time in the transcript and by theme in the conversation to these words that I had noted. I followed Alase's (2017) recommendation of printing out and color-coding words and themes in order to visually organize the words and themes.

Assemblage Analysis

The second method of analysis was assemblage analysis (Feely, 2020; Fox & Alldred, 2015, 2018, 2022; Sinquefield-Kangas et al., 2022). The purpose of this analysis was to gain an understanding of the classroom space, humans, subject matter, language of instruction, art method, and art materials as participants in the assemblage (Hood & Kraehe, 2017; Pacini-Ketchabaw et al., 2017). I paid particular attention to the materiality of bodies (Alaimo, 2010; Neimanis, 2017) in the classroom assemblage as students and teachers interacted and used gestures and dramatic movements. Assemblage analysis added a three-dimensional component to the thematic analysis, overlaying the language of interviews and descriptions with visual diagrams, drawings, and photos of physical spaces and materials. I made note of smells, sounds, textures, temperature, and other sensory elements within the space and the interaction within it.

Poetic Analysis

The third method of analysis was poetic analysis (Bhattacharya, 2008; Butler-Kisber, 2021; Cahnmann, 2003; Faulkner, 2020). For this analysis, I approached interview transcripts and classroom notes as a reader and writer of poetry. In this task, I was conscious of Eisner's (2005) statement that arts-based research in schools is a meaningful way of illuminating the

particularities of teacher experience while connecting universal themes that exist among educators (p.4).

Using the list of themes that emerged from Interviews 1 and 2, I searched for poems in English and Spanish that resonated with the themes. I did this by entering the theme terms into online poetry databases such as Poetry Foundation, Poets.org, OnBeing.org, zenda.com, and lamajadesnuda.com. I also searched for poets from countries where the teachers had connections (Colombia, Peru, Guatemala, and Dominica) as well as the work of Uruguayan poets that I wished to learn more about (Circe Maya, Ida Vitale, Cristina Peri Rossi, Juana de Ibarbourú). Sometimes I was fortunate to recall a poem from my experience as a reader. For example, when Sra. Mary spoke about the importance of the flow of the universe (tao) in her teaching practice, I remembered a series of poems translated by Jane Hirschfield, herself a Zen practitioner and former monastic. I collected poems in English and Spanish that resonated with the themes specific to each teacher. For example, Lana spoke about her parents' deaths, growing up on a farm, her love for rain, and her "electric" energy. Next, I annotated the poems with quotes from interview transcripts as a means of connecting more deeply with the teachers' words by continuing to read and repeat them. This connection to repeating the words of the interviewees was related to a suggestion from Anna Devere Smith (2015), who said, "My lofty goal has been to try to become America word for word" (p. 13). My goal was to enter into the experiences of the teachers by meditating on the interview transcripts and by giving importance to their lives "word for word."

During Interview 3, participants were invited to engage with the transcripts themselves as the starting point for poetic inquiry (Faulkner, 2020). To this end, I showed the teachers how I had engaged with the transcripts by using them to annotate poems. I gave the teachers printed

copies of the poems that I had selected and annotated with interview quotes and class activity notes.

Using the transcripts of Interviews 1 and 2 as a starting point, I invited the participants to create a poem using words or images from our conversations and experiences (see Appendices G and H). The poem prompts were created by me from a series of Spanish Language Arts poem lessons that I had put together for fourth grade classes at OES during the 2022–23 school year. These lessons were expanded further to include English fifth grade students in the Migrant Education Program and fourth grade English and Spanish Extended Learning Time. I was inspired by many scholars who wrote with students (Cahnmann-Taylor & Preston, 2008; Certo, 2017; Diggins, 1975; Frye et al., 2010; Hanauer, 2012; Sekeres & Gregg, 2007) but had noted that when creating poems in classrooms, teachers had mixed reactions. Sra. Mary had an enormous store of examples of poems in English and Spanish for students to work with. Sra. Lana asked me to help her come up with a poetry lesson for her second grade class because she had doubts that she could do it on her own. Sra. Carla had told me that she loved poetry but was not sure that her students had the skills to engage effectively with it. In our short time together, I wanted teachers to see poetry as I would be using it: as a research tool and as a window into another way of knowing. Both Anzaldúa and Bennett refer to poetry as a source of inspiration, language, rest, and delight. The poetry prompts were designed to be an interesting way to triangulate data but also a source of joy for the teachers.

In addition to copies of the transcripts and the annotated poems, I had colored pencils, glue sticks, magazines, and colored paper available. The prompts included individual poems or shared poem activities. Each teacher responded to at least one poem prompt. While they worked on a poem, I did, too. At the end of our time together, we shared our poems and discussed them.

I collected the poems and took notes about conversations around the language, themes, and words that were used in the activity. This interview (Interview 3) was not recorded. The data from this interview were the poems and my notes.

Chapter 5 includes some of these poems as means of disclosing information about myself as a researcher, the participants, and the context of the research site. Hofsess (2015) describes the curation of teachers' poems, doodles, notes, and artifacts as a process that engages with data as vibrant matter and allows for new insight into teacher identities. The poems were created and collected with the goal of forefronting creative, reflective opportunities for educators (Hofsess, 2018).

Some of the poems were written by me as a graduate student in poetry workshops for language educators while I was a research assistant at OES. These poems include a note that cites me as the author. Other poems are "poetic transcriptions" (Glesne, 1997) or "found poems" (Butler-Kisber, 1998, 2002; Prendergast, 2006) compiled from interview transcripts with the participants. These poems are noted as Transcript Poem: Teacher's Name. In the case of poems written by teacher participants, there will be an indication of whether the teacher was responding to a poem prompt, in which case the poem prompt is named, a link to the prompt is provided, and the poem is credited to the teacher.

Overview of the Findings

While poetry was used as a method of data collection and analysis, this study is primarily focused on the quality of teacher experience when incorporating drama activities into DLI elementary school science instruction. The teachers in this study integrated grade level theatre arts standards into their Spanish science lessons. In the following chapters, I analyze interview transcripts, field notes, poems, and photos, looking at how the combination of embodiment and

language in science class impacted DLI students and teachers. Chapter 3 centers on students as they embody science knowledge through theatre games. Chapter 4 turns attention to teachers and what adding theatre and arts-based pedagogies into the science classroom meant for them. Chapter 5 contains my own poetic reflections on the research entanglements of this project.

CHAPTER 3

ACTIVATING KNOWLEDGE: STUDENTS RESPOND TO DRAMA IN THE DLI SCIENCE CLASSROOM

Introduction: Student Engagement with Drama

Within a language learning environment, such as a DLI Spanish classroom, drama provides multi-modal opportunities for participation. At OES, students in DLI classrooms where drama was integrated into science lessons showed evidence of engaged learning and joy. Likewise, the teachers also experienced their own engagement and joy, seeing things they hadn't yet observed in their student learners and becoming co-learners. This chapter focuses on how students responded to theatre activities in the DLI science classroom.

The three teachers who participated in this study all reported that when drama tools were incorporated into the DLI science class, children were eager to engage with Spanish science lessons, including those who were otherwise reluctant to participate in class for a variety of reasons. Students clamoring to act out what they knew was typical of the Fall 2023 study at OES: kids loved embodying science learning. Teachers reported student participation was increased, meaningful, collaborative, and more equitable. Teachers, in turn, displayed their own joy, engagement, and learning as they related to their students and the science material.

Drama as Sense-Making: Meaningful Participation

The arts helped fourth-grader Brian, whose first language is English, make sense of the solar system in Sra. Mary's class. In one activity, students drew notes on a "visual vocabulary" sheet to illustrate ten important terms that were introduced (Figure 1).

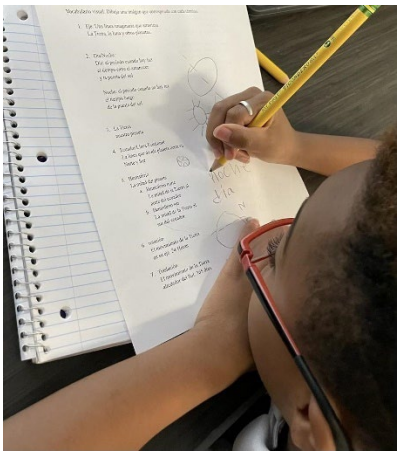


Figure 1: Brian making drawings for his visual vocabulary sheet.

Using those visual vocabularies as references, the class created shared embodied symbols for each of the ten terms from the visual vocabulary sheet. Later, the class chose five terms with which to play a variation of the game "Five Things" (Table 8) from Cahnmann-Taylor and McGovern's (2021) excellent field guide for language classrooms, *Enlivening Instruction with Drama and Improv: A Guide for Second Language and World Language Teachers*.

Table 8. "Five Things" Game

Game procedure: *¿Qué pasó en las ciencias?* ("What happened in science?")
1. Students gather in a circle. 2. The teacher leads the group in a chant: *¿Qué pasó en las ciencias?* ("What happened in science?") 3. The group will cocreate signs for the five vocabulary words—*eje, planeta Tierra, inclinación,noche/dia, órbita* (axis, planet Earth, tilt, night/day, orbit)—and practice miming the signs. 4. For each round of the game, the students chant the question, *¿Qué pasó en las ciencias?* and the five target words with their signs. 5. One person goes into the center of the circle and mime a sign silently. 6. Others take turns guessing the word. 7. When someone guesses the correct word, the person in the center acknowledges the correct answer. The whole group will repeat the word and the sign. 8. The person in the center returns to the circle and the group repeats the steps for each target word. Option: the student who guessed correctly gets a turn in the middle. 9. At the end of the game (10 minutes), the teacher checks for comprehension using any of the following: a. Write the words on the board and ask the students to read the words. b. Draw symbols and ask students to define them using the words. c. Ask the students to define each word.

d. Mime the action and ask students to say/write/define the word.
e. Ask students to make a sentence using the word.

The following week, Brian's class played an online multiple choice quiz game about the solar system. The class was divided into two teams, and each team had 30 seconds to answer a question. When it was his team's turn, the quiz asked for a definition of *traslación* (the Earth's movement of revolution around the Sun). Though Brian could not immediately remember the definition in Spanish, he did remember a shared embodied symbol that the class had created the week before. He became animated, rotating his right fist around in front of his midriff in the gesture associated with the term *órbita*. After a few seconds, the word came to him: "*¡Órbita!*" he yelled, to the delight of his teammates, none of whom had an answer. An interesting note is that *traslación* was not one of the terms used in the game but was one of the terms on the visual vocabulary sheet. Because the definitions are similar, the embodied symbols were similar: *órbita* is the path of the Earth around the Sun, and *traslación* is the movement of the Earth around the Sun. When Brian said *órbita*, his team chose the correct multiple choice option. The second part of the activity required the class to come up with a statement together using the words from the quiz game. The group worked together to write the following sentence incorporating the word from the game and a similar term that Brian remembered: *Órbita' y 'traslación' describen el movimiento de la Tierra alrededor del Sol* (Orbit and revolution describe the movement of the Earth around the Sun.) In Interview 2, Sra. Mary, the fourth grade teacher, reflected on Brian's interventions in the activities, saying, "It stuck. That sense memory helped him. He remembered, you know, and he was remembering it in Spanish." Sra. Mary noticed that pairing language with physical gestures was an important part of Brian's learning and engagement. For Brian, the mind-body connection facilitated sense-making in the Spanish science class.

In second grade, Sra. Lana used drama to make sense of the phrase *inclinación hacia* (tilt towards), inviting the whole class to lean forward to show the tilt of the Earth toward a picture of the Sun drawn on the board (Figure 2). However, this instruction wasn't clear to one student, Adriana (shown below in the pink pants).

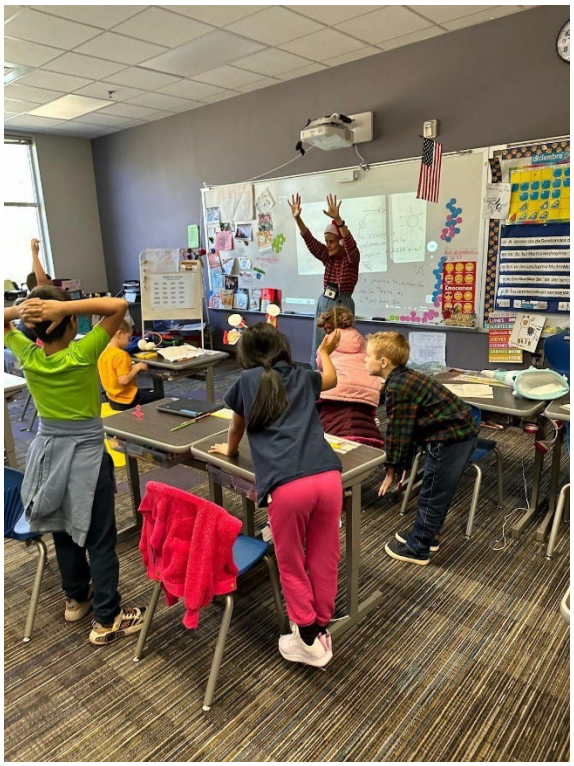


Figure 2: Sra. Lana demonstrates a first version of inclinación hacia el sol. *Adriana, misunderstanding, did not respond correctly to the* inclinación *prompt.*

From her spot in the class, Adriana repeated the word *sol* and waved her hands, but did not behave as if she were the Earth leaning toward the Sun. Though Adriana was participating enthusiastically, she was not participating "meaningfully" because she was not able to make sense of how the class activity related to the facts being taught. After a few repetitions of the directions, it became clear that there were gaps in Adriana's understanding and that adjustments should be made to clarify the game and its connection to the science learning task. Adriana was invited to the front of the class to perform the Sun while another student demonstrated *inclinación hacia el sol* by tilting toward Adriana (Figure 3).

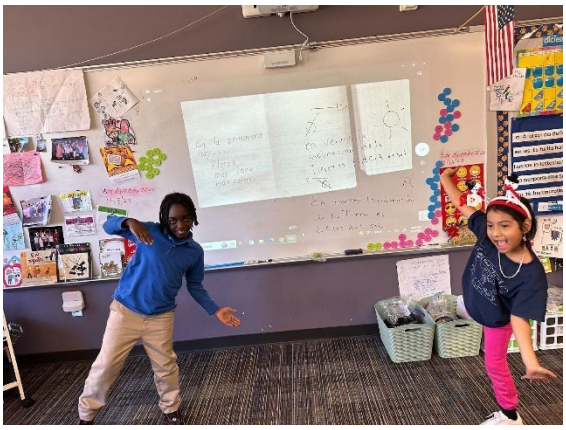


Figure 3: In a second version of the activity, Adriana (right) is the sun with broad rays. Kir (left) leans toward the sun to demonstrate inclinación hacia *(inclination toward).*

When Adriana personified the Sun, and a single student personified the Earth leaning toward her in the summer and away from her in the winter, she understood that the position of the Earth changed in relation to the Sun at different times of the year. This is an example of adapting an existing drama activity to take into account the sensemaking needs of students. The careful monitoring of student behavior allowed the teacher to identify the gaps in comprehension. Because Sra. Lana observed Adriana's wish to understand the role of the Sun more clearly and realized the confusion that could arise from a roomful of planets tilting toward the Sun, she came up with a more streamlined version of the exercise that facilitated Adriana's understanding. The physical and material resources used in sense-making are attached to disciplinary (science) and language (Spanish) terms that students add to their repertoire of words, helping them to communicate meaningfully.

Sra. Carla also used embodied narrative in her lesson on magnetism for her first graders by using students' everyday experience to help them understand an invisible, complex force. Only a few students were familiar with the shapes of the magnets shown on the introductory slide (Figure 4). Several students said "magnets" in English, but Sra. Carla's questions about what the magnets did or what they were made were not answered, either in English or Spanish.

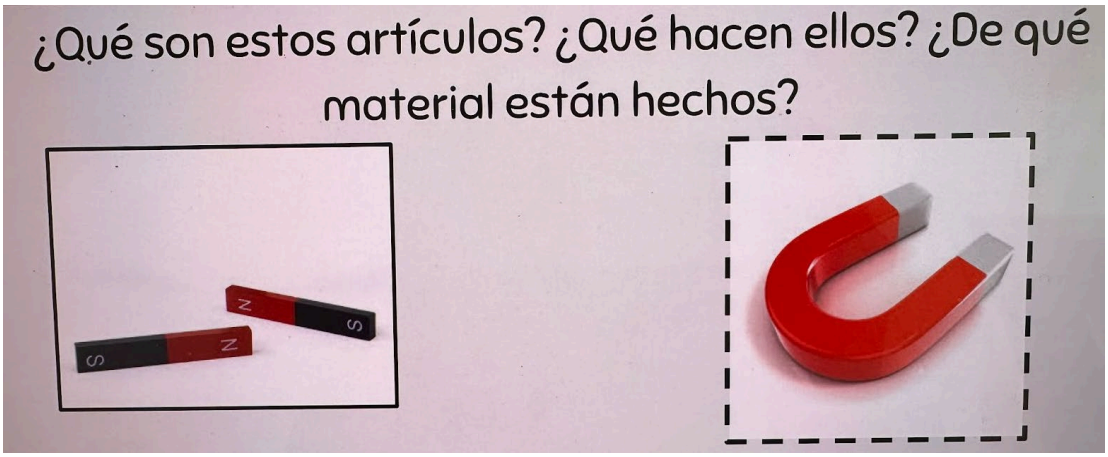


Figure 4: The introductory slide for a lesson on magnetism asked "What are these items? What do they do? Of what material are they made?"

However, the next slide showed a photo of a refrigerator with various magnets stuck to its door. The slide asked students to name one thing that attracts magnets.This slide made a lot more sense to students, such as Jack, who promptly raised his hand, asking to participate.

Students were invited to act out one thing that illustrating magnetism. Avery clapped her hands together in front of her face, as if they were pulled toward each other by a powerful, invisible force. Jack, the next volunteer, launched himself at the smart board displaying the slide and clung to it. When Sra. Carla asked Jack what was going on, he said in English: "I am a magnet on the fridge." After Jack's enactment, other student volunteers wanted to show how they could be magnets and stick to the image of the refrigerator. It was clear that the students wanted to embody magnets sticking to things rather than naming items that magnets are attracted to.

Next, Sra. Carla removed the image of the refrigerator door, drew a paperclip, and asked a new question: *¿Si fueras un magneto, que pasaría?* (If you were a magnet, what would happen?). She repeated the question several times, each time drawing something new on the board: a metal bell, a plastic ball, a key. For each item depicted, a student held the actual item

next to a magnet, demonstrating whether the item stuck to the magnet. Other student volunteers acted out each demonstration, using their body and the image on the whiteboard. Liam rushed toward the drawing of the paperclip. Sara fused herself to the drawing of the bell, just as the magnet had stuck to the bell held aloft by Efraín. Milo showed no interest in the plastic ball, mimicking the lack of attraction between the magnet and the red ball in Ellie's hands. Salomé covered the image of the key with her sleeve with such enthusiasm that the image was partially erased. When Sra. Carla drew another key on the board, Salomé moved her hand to follow the new drawing. Salomé's following the key segued nicely into the next activity: formulating a hypothesis about magnetic behavior in a different situation. Students were asked whether a paperclip on a paper plate would move when a magnet moved below the paper plate. The first step in creating a hypothesis was drawing a picture to answer the question "What is your experience of magnets?" Many students drew refrigerators. This was the first step in making predictions: hypothesis-making was predicated on the students describing their experience and extrapolating what might happen based on that prior knowledge.

By recognizing students' desire to act out "sticking to" things, Sra. Carla prioritized sense-making. This started with Jack communicating his knowledge that "fridge" and "magnet" were connected meaningfully. Jack's imitation of a magnet sticking to a refrigerator door was just as important as Avery's demonstration of an abstract, invisible force. Acting out the connection between magnets and metal enabled students to make sense of the phenomenon, and this understanding would provide the foundation for the students' acquiring meaningful knowledge of magnetic fields, metals, poles, and magnetic attraction. Eventually, the question on the first slide was answered: students had some understanding about what magnets were, what magnets did, and what materials they were made of. Embodied narrative helped the first graders

make sense of what they already knew. After that, they were ready to move toward a deeper understanding of the phenomenon of magnetism and dig into scientific practice: setting up an experiment, making a prediction, and evaluating evidence.

Increased Participation through Drama

Student participation in the science lesson increased when students were encouraged to act out scientific knowledge alongside soliciting verbal answers to teacher questions. For example, when shown an image of a thermometer and asked *¿Cuál es tu experiencia de temperatura?* (What is your experience of temperature?), only one first grader out of 32 in Sra. Carla's class volunteered an answer: a translation of *temperatura* into English. But when students were asked if they could use their bodies to show *¿Cuál es tu experiencia de temperatura?* four students acted out feeling cold (teeth chattering, hugging their bodies, knees knocking together), and six students acted feeling hot (tongues out, fanning their faces, legs and arms held apart). As the lesson progressed, the teacher explained that the tool to measure temperature was called a thermometer, *termómetro*. As more students volunteered to come to the front and act out temperatures, the rest of the class called out labels for what they were representing—*frío* (cold) or *calor* (heat)—and the teacher asked a second student to indicate on the board where the temperature would fall on the thermometer.

Teachers noticed that students who were hesitant in other circumstances chose to add to the Spanish science conversation when they could use drama as a means of participation. Sra. Lana showed me a photograph of Yeni, a student who rarely volunteered in class, acting out cooking at home as part of a unit on changes in matter. According to Sra. Lana, Yeni "struggles with some issues of performance. But boy, today and yesterday she got up and was doing it! She [usually] wants to make sure, 'I'm doing it right.' So that's a big deal." It could be that Yeni's

participation was because she did not feel singled out: her classmates were also sharing their interpretations, and no one was being corrected for "not doing it right" or "not saying it right." Sra. Lana believes that more students sharing about themselves by "acting out" in front of the group influenced the classroom dynamic because it encourages others "to take risks as well and not hold back. It builds friendships, builds community and trust."

In Interview 4, Sra. Mary said that "many more" of her fourth grade students participated when drama was an option because it introduced "an element of fun" and "their affective filter was relaxed." This was especially important to Sra. Mary because four students who were brand new to DLI, OES, and the United States arrived during the first six weeks of school. These fourth graders hailed from different countries (El Salvador, Panama, Mexico, and Venezuela) and had vastly different educational backgrounds (Andy went to Catholic school in a large city in Panama; Sebas and Daviel had not gone to school consistently over the last year in their countries of origen; Jesús went to a rural village school in Mexico). Their age and recent immigrant status were the only factors that determined their placement in the DLI fourth grade class together. Sra. Mary thought that acting out science was a "totally new experience" for Andy, Jesús, Daviel, and Sebas: "they weren't [used to] doing stuff like this." As they were integrated into the OES community, they were welcomed into a way of learning science that was embodied, relational, and fun. However, embodied science activities were new, and some of the structures of school were new for Sebas, who had to be reminded that theatre activities in science are not "another PE activity," said Sra. Mary in our photo elicitation interview (Interview 2). She added that he was not alone: at times other fourth grade students were "so out of their bodies" for various reasons that "getting them engaged in this stuff was work." However, theatre activities helped establish the classroom identity and cement connections among students in Sra. Mary's

fourth grade class, including valuing the newcomers' language skills and home knowledge. "They [the class] have these strong Spanish speakers like Sebas," she said. "That's one great point about doing all of this drama, is that you're just going to learn from the strongest speakers; the strongest language people get to share with everybody." The theatre activities in Sra. Mary's class were fun, but they required real commitment on the part of the students: using their bodies with purpose, connecting to the content, behaving as generous audiences. Sra. Mary's investment of time and energy into creating theatre game opportunities for kids to move, speak, and connect stem from a conviction that theatre games are an effective way for students to learn.

Collaborative Participation within the DLI Science Class

Students added to each other's embodied narratives of phenomena by working together. Some activities had pairs or groups of students responding to each other to show cause and effect of scientific phenomena. Collaborative drama allowed students to see the interconnectedness of material things and also built relationships in the classroom.

Sra. Carla's first experience of integrating first grade science and theatre arts standards was in a unit on weather. The science standard asks students to observe and describe weather using their senses and to identify tools used to measure weather phenomena. At the beginning of the lesson, first graders were invited to sit on the rug at the front of the room. Carla clicked through slides of weather to review the previous week's lesson and settled on a dramatic photo of a tree blown to the side in a hurricane with the caption: *viento* (wind). Students were asked, "What is your experience of wind?" When students did not respond, the question was changed to "Who would like to be the wind?" Several students raised their hands. Chloe stood up and flapped her arms. Jordan knelt down and blew. Francisco crouched and howled. Maria waved her hands toward the door. The teacher had Maria stay where she was and invited Ángel to come

show what happened when he stood in front of Maria, who continued to act as the wind. Ángel was still for a moment next to Maria while her hands moved, but then grabbed the fabric of his pant legs and shook his pants from side to side (Figure 5). When asked what was happening, he said *"el viento mueve mis pantalones"* (the wind moves my pants). When asked, "Does anyone else have experience of the wind moving something?" other students raised their hands. Two at a time, students came to the front of the room, one to be the wind and one to be something that the wind moved. Children showed the wind blowing, howling, waving, dancing; their movements were big, slow, fast, small. Students showed the wind moving their pants, their shirt, their dress, the flag, their skirt, a tree, their hair (Figure 6).

The students were collaborating as they embodied a narrative of scientific phenomena. The wind was in relationship with the trees. Amy and Camila experienced a connection as they showed how hair responded to gusts of air: they had to pay attention to each other as they interacted. As the children acted out natural forces, they participated in the material interconnectedness of a single phenomenon.

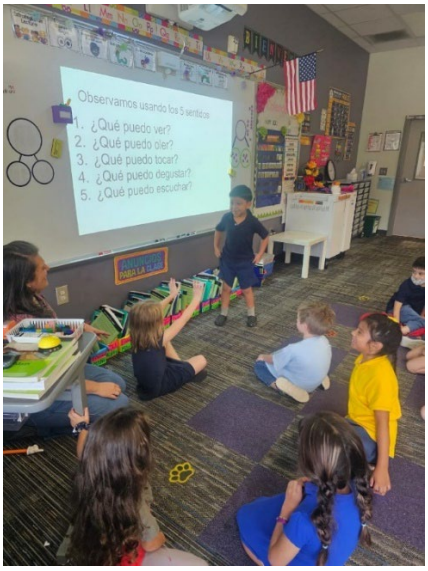


Figure 5. Ángel demonstrates his pants moving in the wind while Maria uses her hands and voice to act as the wind.

Figure 6. Amy gestures with her hands to indicate the wind. Camila shows how her hair moves in the wind.

As students collaborated, they responded to each other personally. In Interview 2, Sra. Carla said that paired improv activities, where one student was the wind and a partner showed how they were affected by the wind, had a powerful effect on relationships between students as they responded to each other within the scene to act out prior knowledge of weather phenomena. Teachers witnessed the development of community between and among students as more students participated in science lessons through the use of drama. Sra. Carla said, *"Hay un trabajo cooperativo, colaborativo entre ellos porque entre ellos mismos se ayudan, entre ellos mismos se colaboran a entender. Entre ellos mismos se apoyan sobre el entendimiento del fenómeno"* (There is a cooperative, collaborative work between them because they help themselves understand. They themselves support their understanding of the phenomenon.).

Language was not a requirement for communication as students learned to behave as audience members and as collaborative partners.

In second grade, the science standard "Patterns in Nature" required students to note the repetition of the seasons and observe how weather, humans, plants, and animals interact to create change. Students acted out how the scenery, costumes, and props would be different in the play *Verano en el Bosque* ("Summer in the Forest") if the title were adjusted to reflect different seasons. So many students wanted to participate that Sra. Lana worried that she would run out of time. She called students up in groups to show what they knew about what to wear, carry, eat, and observe in the woods during winter, spring, and autumn. Though it took longer than expected to give everyone a turn, Sra. Lana noticed that the second grade audience members were engaged with their performing peers. During Interview 2 she said, "They're just not sitting there, getting. They're doing and they're giving. Then they're giving encouragement to others by seeing them."

The classroom ecosystem was modified by drama activities. Student embodiment of the interconnectedness of material scientific phenomena spilled over into classroom dynamics. Collaborating as actors or audience members contributed to community-building as students listened, watched, and responded to one another.

More Equitable Participation through Drama within the DLI Science Class

Teachers experienced classroom shifts as students engaged with each other more frequently and differently through theatre exercises. "How did the dynamics change?" Sra. Lana asked me rhetorically during Interview 4. "It builds respect for someone who is not like you or maybe who is like you but has had different experiences. It builds a culture of respect and community."

Students were sharing about themselves and learning about each other by participating in their classmates' lived prior knowledge as it was acted out. During Interview 4 Sra. Carla said, *"Desbordan una curiosidad increíble, una sensibilidad y una empatía el uno hacia el otro*" (They overflow with an incredible curiosity, a sensitivity and empathy toward one another.).

During our photo elicitation session (Interview 2) Sra. Lana noted that the English speakers' voices were often the ones that were most dominant in second grade, even in the Spanish class. Finding ways to include the experiences of students who were not vocal was important. "This little fella," she said of Orlando, a very quiet Hispanic student, "lives a life and does stuff and has a family and goes out to play and he probably goes to church, and so many other things." When asked to complete the sentence stem written on the board *En otoño…* (In autumn…) Orlando walked to the front of the class, stood with legs together and arms raised, then fluttered his hands to the ground. After a beat, Casey, an English speaker, called out "The leaves are falling!" With some prompting, Casey added in Spanish *"¡Hojas! ¡Caen! de los árboles."* Acting, as well as English and Spanish writing and speech, were all employed in this activity. Casey, who may have had English and Spanish speech and writing immediately available to her, was not prioritized over Orlando, who was able to show his knowledge by embodying a visual narrative. In this exchange, Orlando established that in the particularities of his own life, he had experienced the falling leaves of autumn in a way that his more talkative, English-preferring classmate Casey, could recognize. Together, Casey and Orlando understood both each other and something about the seasons because they were able to draw on multiple means for communicating meaning: words and body, English and Spanish, visual and auditory narratives, silent and spoken gestures. Orlando's acting and Casey's labeling connected them to each other and the rest of the class around the phenomenon of leaves falling in autumn.

Insight into Unique Life Experiences through Drama in the DLI Science Classroom

Orlando and Casey were able to identify with each other as they described the phenomenon of autumn in Georgia. However, drama games also made visible the reality that not all student experiences were the same, and not all students had classmates who could connect with their experiences. The particularities of students' lives could render their sharing almost unrecognizable to their peers. For example, a group of fourth grade students were asked to act out what they knew about how ice melted to begin a lesson about heat transfer. Three students, Jackson, Lilian, and Amanda showed variations of slow, fluid movements as they "melted" from a standing position and spread gracefully across the classroom carpet. Other children in the class nodded, laughed, and showed signs of agreement. Another student, Natalia, stood up straight and then quickly crashed to the ground in a chaotic heap of angled limbs. Natalia's interpretation did not generate connection between students; she seemed to be showing a totally different phenomenon from her other melting classmates. This presented the teacher with an opportunity to intervene, model looking for an explanation, and display wonder at how phenomena can be experienced in multiple ways. Natalia, who had moved to Georgia from Chile, described glacier shearing—violent and sudden—that she had learned about in Chile. Jackson, Lilian, and Amanda had lived their whole lives in Georgia and said that they knew about ice primarily from restaurants, where it melted slowly in styrofoam cups or pooled into puddles on the table. In the photo elicitation interview (Interview 2), Sra. Mary, the fourth grade teacher, explained that dramatic learning was meaningful because it engaged the students' experience, their senses, and the subject. "They're connecting with the content through their experience. And it's not isolated. It's not like isolated words, it's everything. So it's holistic, holistic activities, so they're using kinesthetic, they're using art, they're using music, they're hearing, it sounds nice. I love listening

to people speak Spanish; it's like a song for me." What is especially significant in the case of the ice melting example is the expansion of the students' own experience to include the experiences of their classmates. The classroom community was eventually able to connect to the standard in a new way through the Natalia's experience of glaciers in Chile.

The dramatic activities provide more equitable participation by including more voices in the classroom conversation. Additionally, these new voices enabled access to different knowledge by inviting classmates to share in diverse experiences of scientific phenomena. Drama games inspired inquiry into students' unique experiences and knowledge and fomented greater dialogue among learners as well as between students and teachers.

CHAPTER 4

ENACTING ENCHANTMENT:

TEACHERS RESPOND TO DRAMA IN THE DLI SCIENCE CLASSROOM

Teacher Experience of Drama in the DLI Science Class

As part of this study, three OES teachers co-planned and co-taught lessons that integrated theatre arts standards with grade level science standards. The previous chapter focused on students and the impact that theatre games had on their classroom engagement. An important part of this study consideration of teachers' experience employing arts-based methodologies in their science DLI classrooms.

Each of the three teachers in the study was aware of the uptick in student interest and classroom involvement when drama was included in the lessons. Sra. Lana, Sra. Carla, and Sra. Mary expressed gratification that students were using Spanish and disciplinary vocabulary, showing enthusiasm for science content, and building affective connections within the classroom. As they were planning, teaching, photographing, and participating in interviews, the teachers were interpreting the drama activities and their role in the classroom.

Classroom Management: Drama as a Tool for Self-Regulation

In Interview 4, Sra. Carla said that acting out science "*permite que ellos puedan expresar sus emociones*" (allows them [first graders] to express their emotions). When asked to clarify what this meant, Sra. Carla explained that drama gave students another means to express themselves. Adding gestures and embodiment to their repertoire of words and language decreased frustration and the fear of embarrassment that they might say the wrong thing or not

know the right word. An immediate effect of incorporating theatre games in Sra. Carla's class was normalizing the use of physical gestures to accompany Spanish words. Sra. Carla's use of motions in science lessons carried over into other areas, such as rubbing her hands together when instructing students to wash up before snacktime or miming zipping up a coat when telling students to fetch their jackets for recess. In a DLI staff meeting in October 2023, Sra. Carla shared with other teachers that acting out words with *señas* (gestures) was a strategy that she had adopted successfully to lower the anxiety of language learners in her DLI class.

During the photo elicitation interview (Interview 2), Sra. Mary shared her thoughts about class management, saying that drama and arts activities encouraged self-regulation because "students feel more in control of their learning." She gave the example of Daviel, one of the newcomer fourth graders who arrived at OES with limited previous formal education. Daviel sat at the front of the class with Hank, an English-preferring student who had been identified as gifted and was also very easily distracted. The following is excerpted from Interview 2 with Mary:

> Mary: [Daviel] came in super low in all the initial assessments and I was like, but he is not 'low'! This is just a kid that needs to get pulled in a little bit like this [indicates photos of activities] and told, 'You can do it!' And he can. So he's always up front with me. You know, he sits right in the front because he needs that much help. But he's very capable. And he was doing this: I got photos of him drawing his symbols for the vocabulary. And he was up front that day, acting. He's very capable. And Hank, his issue is not so much competence, it's just focus. So this is good for them.
>
> Elizabeth: So, did you think that this helped them? Did the visual vocabulary and drama activity help them focus?
>
> Mary: Yeah, it did. Because they're using another modality. We're just not going to write up the definition. No, we're gonna actually draw what it looks like in space. How it moves in space. And so they have to use their imagination…They were on task. And it's a lot for those two to stay on task.

Mary saw that the arts activities (detailed in Chapter 3) allowed Daviel and Hank, students who struggled for different reasons, to engage deeply with the Spanish science material about the solar system. As the boys moved between drawing their visual vocabulary, working collaboratively to create shared embodied symbols of key terms about the solar system, acting out the *¿Que paso en las ciencias?* game, their teacher saw that they were working productively. Daviel, with limited formal education, and Hank, who received additional Gifted Education services, both benefited from drawing, moving, playing, and embodying the solar solar system.

Delighted by Drama in the DLI Science Classroom

Teachers made note of students' joy and engagement when using drama in the DLI science classroom. During the photo elicitation interview (Interview 2), each of the teachers made reference to "fun" in relation to student engagement as they showed me images of the children in their classes. Likewise, teachers expressed personal feelings of visibility, freedom, and joy. In classroom activities, my notes and photos include references to numerous nonverbal and embodied indicators of levity: teachers laughing, smiling, and playing with students.

During Interview 2, Sra. Mary showed me a photo of an activity (Figure 7) and described how Roberto's demeanor was transformed when acting out the Earth's rotation with another student. "He's animated. And I just love that. Look at that, they're both smiling. He's such a ham. He's usually not like that. You walk in a classroom and see Roberto and he's so serious." Sra. Mary saw a new side of Roberto as a result of the theatre activity. At the same time, Sra. Mary believed that her relationship with her class changed because of her playful interaction: "I think that the students feel closer to me, and see me less as an authority and more as a participant."

Figure 7: Roberto ("such a ham") acting as the Sun with a phone flashlight. Ariel inclines her body to show the tilt of the Earth.

During the photo elicitation interview (Interview 2), Sra. Carla said that she was "nourished" as a teacher by the delight that the first grade students took in learning science using drama. "*Me encanta, lo disfruto. Me gusta que ellos son niños de primer grado todo se maravillan, todo les parece bonito. Esto me parece que alimenta mucho esta profesión*." (I love it. I enjoy it. I like that they are first grade children who marvel at everything, for whom everything seems beautiful. This seems to me to be a source of nourishment from this profession.) In Interview 4, she added that incorporating drama "*ayuda y motiva a los niños a disfrutar y a ver a la clase de ciencias como un juego*" (helps and motivates children to enjoy and see the science class as a game).

In Interview 4, Sra. Lana cited fun as a way to establish school as a place of safety for children. She said that when she notices some second grade students reluctant to engage with the

class, “I want to reach out to them to get them involved in it, because sometimes they’re too cool for just being a kid. And remember, ‘Hey, you’re a kid.’ And they and I usually get into it and have fun.” Incorporating theatre activities got more students to participate because it reminded the students that they were kids and that having fun while learning was appropriate and right for second graders. “What kid doesn’t like to get out of the chair?” she asked me, rhetorically. “What grown up? I like to do stuff!” Drama activities were a chance for Sra. Lana to show that she relates to the students’ desire to move, play, “get out of the chair,” “do stuff,” and have fun. The drama activities also established trust between Sra. Lana and the students. When I asked her how the drama activities had affected the way that the children related to her or each other, she said, “We can relax and we can be safe with each other. Through the months we have just established that culture: we’re here to learn. We respect each other, we love each other.” She went on to say, “It’s really quite true: when you have people that you know support you, where you know you feel safe with them, you grow because you can be honest with them, building community, building a community of respect.” Sra. Lana was not only cultivating delight with her students through theatre, she believed that the theatre activities were also creating an environment where second-graders felt safe to be kids.

Teachers were affected by students’ reactions to drama in the DLI science classroom. Sras. Mary, Carla, and Lana expressed delight as they showed photos of their students engaging with the subject, participating meaningfully, and having fun. The teachers also relished the chance to embody learning themselves and enjoyed playing, moving, gesturing, and acting with the class.

Surprised by Drama in the DLI Classroom

In addition to being delighted by drama, the teachers found that "fun" often coincided with "surprise." These were moments where students displayed something that had been less visible before. Some of these revelations were about the children's lives, personalities, and home cultures. Some insights were about science or teaching, because drama allowed them to interact with students and content in a new way.

Sra. Mary gained insights about science from classroom drama. In one fourth grade activity, students acted out what they were doing at 8:00 p.m. at different times of the year: March 21, June 21, September 21, December 21. Students were asked to show what the sky looked like while they did these activities, and several students drew a sun in the sky for their June 21 activities. Newcomer Jesús, on the other hand, drew a moon at 8:00 p.m. Sra. Mary asked him if he had noticed that the previous night at 8:00 p.m. (in September) the sky was still light; he shared that in his hometown in Venezuela, close to the equator, there was not any noticeable difference in daylight hours as the seasons changed, and that 6:00 p.m. was the sunset time year-round. Sra. Mary expressed delight and astonishment at this information, explicitly positioning herself as a "co-inquirer" (Tabak & Baumgartner, 2004, p. 415) with her students. Together the teacher and students looked up information about daylight hours of various Spanish-speaking countries and U.S. states to compare winter and summer daylight hours. In Interview 1, Sra. Mary said that teaching science, for her, is "the wonder and joy of figuring stuff out." In this instance, she modeled the "wonder and joy" of teaching science through her questions to Jesús and through her genuine interest about his life in Venezuela as well as the experience of students who had spent time with grandparents in Wisconsin or other states with different daylight hours. She also showed students how she worked at "figuring stuff out," asking

them to suggest Google search terms for daylight hours of locations they frequently visited. Sra. Mary experienced the journey from not knowing about daylight hours in Venezuela to co-learning with her students. This process was mediated through drama as a new student, Jesús, was welcomed into the community of the classroom and his life experience was shared.

Because science had previously been taught in English at OES, the 2023–2024 school year was Sra. Carla's first time teaching science in DLI, and she was surprised by how much she enjoyed the experience. In December 2023, she reflected on the experience in Interview 4: *"Al comienzo tenía un poco de temor, pero realmente la ciencia desborda la creatividad y la curiosidad"* (I was a little afraid at first, but really, science is overflowing with creativity and curiosity). When I followed up to ask how using theatre activities in class impacted her experience of teaching science, Sra. Carla said, *"Mi experiencia es que ellos piden por su clase de ciencias. Me parece que les ayuda a ellos mucho la motivación. Eso ha sido muy gratificante y les ayuda a ellos en la participación en clase*" (My experience is that they ask for their science class. I think that it helps them be motivated. It has been very gratifying, and it helps them participate in class"). Seeing the students' delight was a positive feedback loop for Sra. Carla as a teacher, who noted that students enjoyed science as a discipline, but that they particularly like the way that she teaches it, integrating hands-on and arts-based activities: *"no solamente el concepto pedagógico de la clase sino como el concepto lo uso yo con el experimento y el arte"* (not only the pedagogical concept of the class but the way that I employ it, using experiments and the arts). This was a surprising and rewarding journey for Carla, who in Interview 1, in September 2023, described her reaction to being told that she would have to teach science during the 2023–24 school year as,*"Al comienzo, estaba, NO!"* (At the beginning, I was like, NO!).

Sra. Lana was surprised to learn through drama new details about what life was like at home for her students. Her second grade students were invited to act out what they knew about mixing water and flour as part of a lesson on changes in matter. Santos was eager to show his expertise in making tortillas, patting his hands together to show how he flattened a ball of dough (Figure 8). He then added word labels to make clear that tortillas were made with corn *masa*, not wheat flour. A classroom conversation followed in which Sra. Lana learned that *masa*, in addition to being the term for "uncooked dough" with which she was familiar, is also the term for nixtamalized corn flour. Sra. Lana had cooking experience with wheat flour but was recast as a student, learning about a new ingredient. In the ensuing rush of students to demonstrate what they knew about *masa*, acting out making pupusas, arepas, tamales, and tortillas, Sra. Lana saw that corn *masa* was a primary food staple in the homes of many of her students. In Interview 4, I asked Sra. Lana what the class environment was like after students shared about their home lives in an academic subject (as opposed to in "morning meeting" or other designated "share time"). "Chattier and happier," she said. "Happier because they were valued. Somebody listened to them. Somebody thinks [they] are important."

Figure 8: Santos acts out his technique for making tortillas with masa.

Sras. Mary, Carla, and Lana experienced moments of surprise when they included drama activities in their science instruction. Theatre activities provided opportunities for teachers to gain another point of view and to see their students, their lessons, and themselves differently. The insights that they shared pointed to their openness to experiencing surprise, delight, and a change in perspective.

Planning for Drama in the DLI Science Classroom

Engaging in drama activities affected lesson planning. All three teachers were motivated to continue using drama in their DLI science classes, but they considered it valuable for different reasons.

To Sra. Lana, the theatre activities seemed to indicate that deeper engagement is possible and heightened her desire to "do more." In Interview 4, I asked Sra. Lana how she felt about using drama in Spanish science class and she said, "This is a good thing, we need to keep doing it!" Sra. Lana was pleased with student engagement in science but voiced concerns that she was not doing enough in other areas and that she needed to encourage student participation even more in math and phonics. "I need to figure out more ways to get them up and moving and engaged, because if they're just sitting there dreaming about their Pokemon cards, we're going nowhere." Sra. Lana exhibited a great sense of responsibility as the leader in the classroom, saying, "It's up to me as a teacher, as a cheerleader. It just motivates me to do more. And to think, what else can I do?" The theatre activities in science class showed Sra. Lana how much excitement, engagement, and movement was possible with her students, and the positive feedback from students drove her to incorporate drama even more.

In contrast, Sra. Mary indicated that the theatre activities relieved some of the responsibility that she felt in the classroom. During Interview 1, Sra. Mary had cited feeling "very intense pressure" as a teacher:

> I think the hardest thing about what I do is… You know, just what I think a teacher in the year 2023 is experiencing, not just in the state of Georgia but across the United States, is the amount of pressure we have. In terms of testing expectations, curriculum expectations of what we're expected to teach, and now we have culture wars going on, what we can't say, can't do. And just school safety in general. You know, those are the things that make me ponder, on a daily basis, the amount of intense pressure, very intense pressure that we have as teachers.

Ceding the front of the class to students who are acting out learning appeared to ease some of the burden that she felt. During interview 4, I asked how theatre activities impacted her as a teacher. Sra. Mary said, "I feel that I am not at the center of the experience." She went on to elaborate that the teacher-student dynamic was altered as a result of theatre activities: "the experience of learning is shared more," she said. "I felt more open, moving more freely within the group." Sra. Mary also said that her science planning includes theatre activities for practical reasons: "students remember vocabulary better" and "errors are minimized with movement and repetition."

During Interview 1, Sra. Carla described herself first and foremost as a teacher: *"Toda la vida fuí maestra. Es lo que sé hacer, me gusta hacerlo y por eso estoy trabajando acá"* (All my life I was a teacher. It's what I know how to do, I like doing it, and that is why I work here). She also identified herself as a pioneering teacher who enjoyed trying new initiatives to engage students. *"Me gusta hacer cosas innovadoras porque aprendo. Es un reto personal y profesional. También porque soy muy creativa"* (I like to do innovative things because I learn. It is a personal and a professional challenge. Also because I am very creative"). Sra. Carla's view of herself as a professional educator includes a desire to continue learning and innovating. Using

classroom drama provided her with an opportunity to observe student learning and put into practice new techniques. During Interview 4, Sra. Carla expressed a desire to continue using arts-based methods in the science class. *"Me parece que hay una mágica relación entre la ciencia y el arte porque me ayuda a entender de manera real cómo se aprende*" (I think that there is a magical relationship between science and art because it helps me understand in a real way how learning happens). When asked to elaborate, she said, *"Fue muy llamativo el ver algo novedoso que convivimos a diario con ellos pero no le prestamos mucha atención"* ("It was very striking to see as novel something that we experience daily with them [students] but to which we don't usually pay much attention"). Sra. Carla described students taking time to interact with commonplace phenomena such as wind, rain, and magnets as they sought to recreate them through drama. "*Me parece que ellos les ayuda a expresar su conocimiento con el uso de su cuerpo"* ("I think it helps them to express their knowledge with the use of their body"). For example, as students noticed and embodied the interplay of light and shadow during a theatre arts integrated lesson on Light and Shadows, they became aware of the nuances of natural and artificial light sources, the light's intensity, and the effect of distance on the length of the shadow. She went on to say that the drama activity *"ayudó a que ellos entiendan cómo la luz funciona sobre un objeto y cómo ese objeto refleja una sombra"* ("helped them to understand how light acts upon an object and how that object reflects a shadow"). The process of "acting out" itself had various components: students watched, copied, experimented, and modified their movements in order to embody light and shadow. Sra. Carla saw student learning happening in real time as students slowed down their observation of phenomena in order to recreate it. This process appealed to her as a scholar educator who could try an innovative approach to teaching science.

CHAPTER 5

EN CARNE PROPIA / EMBODIED SELVES: TEACHER, RESEARCHER, OTHER

Poetic Reflections on Research Entanglements

The previous findings chapters have explored how integrating theatre arts standards into science lessons impacted students and teachers who participated in this study. In this chapter, I consider the relationships at the research site and the continua between boundaries of researcher and data. The question that guides this exploration is:

RQ 3: What entanglements exist within the DLI Science classroom as a research site?

This chapter considers the interactions between researcher, participants, data, site, language, and culture and illuminates them through poetry. The poems collected below engage with the research question by reflecting on three areas of entanglement: roles, relationships, and bodies. The poems were selected because they discuss the identities of bilingual educators or the interpersonal associations that bilingual educators have, or they point to a material essence of what it is like to be an educator in a bilingual context.

Central to this section are the notions of "in-between" and materiality. My role as a poet, researcher, and teacher did not have clear between and among the research context, my current work in an elementary school, and my personal life history. "In-betweenness" characterized my time at OES. In my role as graduate assistant, I was officially a researcher but also a co-teacher, resource aide, coach, classroom assistant, language interpreter, and pedagogical guide to teachers with a variety of learning and instructional experiences. The bilingual teachers and I found ourselves "in-between" Spanish and English as we moved through planning meetings at the

building or grade level (in English) or in the DLI team (in Spanish). Classes, likewise, were transdisciplinary as we integrated theatre arts standards into grade level science standards. In conversations with families, I slipped between English and Spanish, sharing cultural references with other Latin American community members. For instance, when making announcements on Book Character Day, I mistook the rodent from the popular children's book *If You Give a Mouse a Cookie* (Numeroff, 1985) for the animatronic mole Topo Gigio, originally an Italian television show that became very popular in Latin America. I felt silly about my blunder, but several parents came to tell me that they had also grown up watching Topo Gigio. One mother, who was twenty years my junior and had grown up in El Salvador, a country which I have never visited, embraced me and said, *"¡tuvimos la misma niñez!"* (we had the same childhood!). This connection within confusion was a moment of enchantment, a surprise opportunity to resonate with another person through shared language and culture. In my time at OES, the researcher, families, and teachers were sometimes intertwined through our mutual interests, tastes, sensibilities, language, culture, life experiences, and our shared goals of preserving and elevating Spanish within an English-speaking school.

When considering the research site, entanglements include embodied experiences of teacher and researcher. This includes visible and invisible health, age, and physiological markers. It also includes cultural assumptions, expectations, and practices. In the classroom space, as students embodied past experience through performance, the embodiment of the teachers was also a "thing" that was materially present. Bennett (2020) uses Walt Whitman's term "phiz" to describe the awareness of "infra-body eddies of influx and efflux" (p. 6) that include human posture and manners, the environment, and material objects in space. "Phiz" includes the body—"physiognomy + physique" (Bennett, 2020, p. 1)—but is both a product of culture and a shaper

of culture. Whitman used "phiz" to describe Americanness: a disposition toward democracy that he illustrated through descriptions of bodies. Bennett writes:

> political institutions + social and ethical norms + a repertoire of phiz and mood (including the bent arm and tilted head of nonchalance, the pluck of bent back and curv'd limbs, the friendly inclination, the foot planted in a field of sprouting affections)—all these must be operative if America is to realize the especially diverse and pluralistic kind of democracy that Whitman thought was its best bet. (p. 26)

Just as a tide pool creates a tiny ecosystem where a wave, shell, toy boat, or paw can have an impact, "phiz" is profound interconnectedness, an "uncanny belonging" where human and non-human impact and reflect one another (Bennett, 2020, p. 24). I build on Bennett's understanding of Whitman's "phiz" as a manifestation of and influencer of culture beyond Americanness in this section on embodied entanglements.

The photo interview revealed some of the entanglements of this study by providing moments of reflection for me about myself, my role in the classroom as a researcher, and my relationships with the teachers who participated in the study, as well as an opportunity to view my body from the teachers' perspective. My physical presence ("phiz") in the classroom had an impact on the classroom because I brought the materiality of my body and the embodiment of culture.

My cultural interactions with teachers and students include my recognizable Rioplatense accent, which establishes my identity quickly. "Phiz" is included in reflexive statements such as *a las órdenes* (at your service), manners of address (the Latin American tradition of calling teachers *maestra* or *profesora* [depending on grade level] along with their first names, so that I am Maestra Eli or Sra. Eli), expectations (Spanish classes typically stop and say *buen día* when an adult enters the room; in English classes, adults can walk in without interrupting the class flow), and greetings (typically with a cheek kiss). These cultural, relational, physical components

among the Spanish-speaking population at OES have made me feel at home and have created a sense of material authenticity for the DLI community.

The photo elicitation portion of the project (Interview 2) made manifest the presence of my embodied self in the research. As a middle aged woman who shies away from the camera, seeing candid footage of my "phiz" self in unposed, unfiltered interactions was unusual. Where I would usually click past these images or crop myself out, I found myself looking from the teacher's perspective and seeing myself in her pictures and videos of the classroom activity. I realized that my presence in the classroom had an important impact. Adding my body to the research data created a "personal citation" (Neimanis, 2017) to the research. This citation includes the biological biography of where the body has been and its culture (Alaimo, 2010). Biologically, my body includes what is visible, such as hair and eye color, height, and weight. It also includes the biotic communities of waterways from which I have accessed drinking water and environmental pollutants to which I've been exposed.

Looking at myself, I am also aware of specific geographic, biological, and cultural overlaps in my personal citation, such as antiphospholipid thrombophilia, rare in the world population but mysteriously common among Uruguayan women of my generation, resulting in multiple late-term miscarriages. In the photo where I am kneeling on the rug with a group of children in 2023, I see many versions of myself in a single frame. In my posture I recognize the 26 year old me that sat in the grass with students in Uruguay, longing for a healthy baby. In my listening to students tell how they experience wind at home, I am my ten year old self, learning from *tía* Gloria how to adjust making *ñoquis* on a stormy day to account for the extra humidity. As I watch students imagine a different landscape than the rainy parking lot outside the classroom window, I am 15 years old, shaded by the red boat, dreaming of sand-free Chicago.

My embodied "phiz" includes the materiality that is Uruguay, thrombophilia, sand, *ñoquis*, Georgia, Chicago, children, and classrooms.

An important difference between Anzaldúa's and Bennett's understanding of body and embodiment has to do with their orientations toward the spiritual. Anzaldúa included poems and doodles in her theorizing that served as the *Coyolxauhqui* practice of healing (Anzaldúa, 2015) but also as a disruptor of imposed poetry/prose, sacred/secular, reader/writer, form/content binaries (Lockhart, 2006). While Bennett finds compelling cause for non-teleological and non-theological ethics and enchantment within the material world, Anzaldúa's spirituality is an important part of her decolonial discourse (Schaeffer, 2015). However, poetry and translanguaging figures in the work of both Bennett and Anzaldúa as both a way of knowing and a way of creating and reflecting upon knowledge.

The poems that follow come from a variety of sources and illustrate some of the complexities associated with embodied "phiz." The poems are also part of research that disrupts binaries. Those that are responses to a poem prompt are credited to the teachers who created them from the transcripts of their own words. The poems that I created using transcripts are labeled Transcript Poem: Teacher's Name. (The poem prompts can be found in Appendix H.) The poems that have my name were written between 2020 and 2023 in poetry workshops for language teachers at UGA while I was a graduate research assistant at OES.

Poems Teachers Wrote Using Transcripts and Poem Prompts

"Somos Maestras," "El mejor segundo grado," "In Guatemala I was a public health worker," and "'In-between' is how I feel" are poems written by the teachers during Interview 3. Each teacher chose a poem prompt to use as a tool to review the transcripts of Interviews 1 and 2. In the case of "Somos Maestras," I changed the capitalized letter at the beginning of each line; otherwise,

choices of spacing, titles, and line breaks were theirs. In the case of Mary's renga prompts, we wrote several versions of the shared poems and she put together the final versions from the drafts.

These poems are "found poems" (Butler-Kisber, 1998, 2002; Prendergast, 2006) as the poets looked for words and phrases within the document and put them together in a meaningful way. It was interesting to me to see them interact with their own words that had been recorded and typed, recognizing their voices in the text. Mary made several adjustments to her transcripts while we worked on Interview 3, and she responded to multiple prompts. Both Lana and Carla chose to respond only to the acrostic poem prompt.

The poem prompts were written in English and Spanish, and I showed teachers example poems that were in English, Spanish, and translanguaged. Teachers chose the language in which to write their poems. In my own exploration of the transcripts, I created poems in English, Spanish, and a mix of both languages.

Poem Prompt Response
Acrostic Poem
Carla

Somos Maestras

Nosotras creamos con ciencia y
amor por la tierra, este
trabajo es de
una comunidad entera
responsable con la vida, y en el
aula aprendemos a ser
los primeros que ayudamos a
educar y a reciclar, pongamos los
zapatos para cuidar y
amar nuestro hermoso lugar.

Poem Prompt Response
Acrostic Poem
Lana

El mejor segundo grado

Feria de preguntas sobre los animales
alrededor del mundo de maravillas.
Mucho interés en participar,
no solo observar.
Insectos enseñándonos,
listos para probar y experimentar,
investigación de lo misterioso y
lo común,
aprendiendo no sólo como funciona el mundo
pero porque.

Poem Prompt Response
Renga
Mary

In Guatemala I Was a Public Health Worker

En las escuelas
I'd imagine those kids with
opportunities

in another place and time
learning more and needing less.

Poem Prompt Response
Renga
Mary

"In-between" is how I feel

I bridge hemispheres
family and languages
multiplying both
I am in between, defined
by all those relationships.

Poems I Wrote Using Transcripts

The following poems were written by me using the transcripts from teacher Interviews 1 and 2. I presented some of these poems to the teachers during Interview 3 to illustrate how I was using the transcripts and poetic inquiry in my research. I wrote "Will we have science next Friday?" while Carla composed "Somos Maestras." I created "Me identifico con la lluvia but I'm not sure why" as an example of a collage diamante poem based on Interviews 1 and 2 with Lana. "We have a relationship and we just trust each other" is a renga I wrote based on Interview 2 with Mary. "She spoke Arabic in the house" was written in January 2024 and is a poetic transcription (Glesne, 1997) of Lana's Interview 1, with the final line coming from Interview 4. It uses only Lana's words, and they appear in the poem in the chronology in which they appear in the interviews.

My experience of Interview 3 is that all of the teachers were surprised by my attention to their interview words and how familiar I was with the transcripts of our interviews. When I presented them with the poems that I had created I explained my choices of subject matter and the connection to our interview. During Interview 3, I also shared poems in English and Spanish that I had used to learn more about some aspect of the teachers' experience. For example, Lana had said in Interview 1 that she identified with rain but didn't know why. In response, I collected a series of poems about rain and annotated them, looking for insights into why she might feel such a connection to this phenomenon while also feeling so different from it. I was particularly moved by our discussion of her parents' deaths and her memories of early childhood in rural Ohio. Thomas Hardy's poem "During Wind and Rain" made a connection between rain drops, rural life, memories of childhood, and gravestones that I used as an anchor in my collage found poem "Me identifico con la lluvia but I'm not sure why."

She spoke Arabic in the house

In those days, marrying a non-Syrian
would isolate you from your family.
It did.

My dad moved her to the farm.
Before freeways, ten miles was
out there.

See, I never got to know my mom as an adult,
hear what she was like as a kid.
You don't get over that.

So, we grew up chaotic:
he was pretty much a loner,
we were kids with dirty faces.

But summer was great: garden, orchard, fields,
lunch through the window,
not one bit worried about baths.

My mother was an artist, but I was never.
(I miss my mom, I mean, who doesn't?)
I was a critic.

Transcript Poem
Carla

Will we have science next Friday?

Reflejan los sonidos.

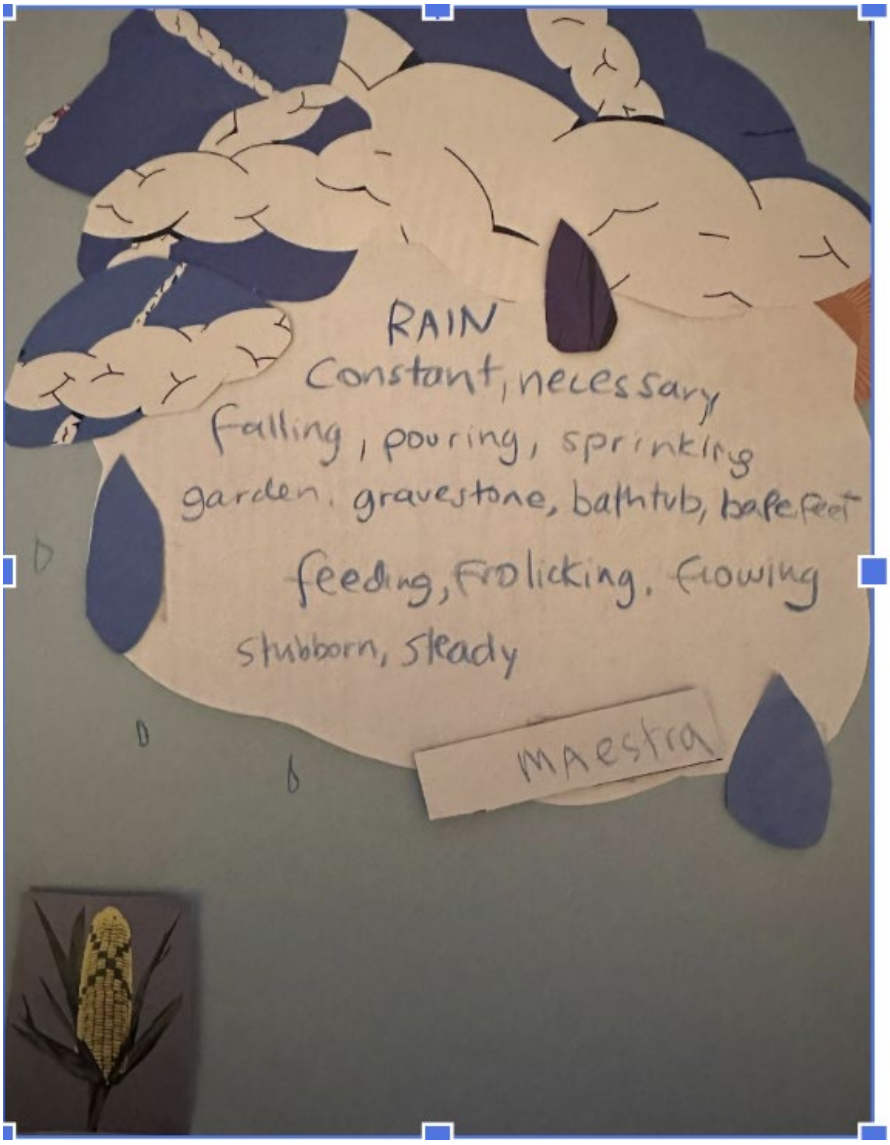
Cada personita me refleja
el sonido de un animal,
un pájaro, un pato, un bosque
evidencia que
soy consciente de donde estoy,
tengo los pies plantados en La Tierra.

Este labor que tanto alimenta:
preparar la huerta
trabajar a la par,
evidenciar lo que sembró el maestro anterior.

es tan bonito cuando me preguntan
¿El otro viernes hay ciencias?

Transcript Poem
Found Poem
Lana

Me identifico con la lluvia but I'm not sure why



Transcript Poem
Renga
Mary

We have a relationship and we just trust each other

I love team teaching.
There's a mental connection:
so fun, like improv.

Then I got home and found out
we have squirrels in the attic.

Poems I Wrote when Researching Bilingualism

The last series of poems was written by me in poetry workshops with Dr. Melisa Cahnmann-Taylor, a poet and scholar of bilingualism at the University of Georgia. Between 2021 and 2023, I enrolled in three graduate poetry seminars: Poetry for Educators, Writing Cultures, and an Advanced Poetry Workshop for Interdisciplinary Understanding. My instructor is also bilingual in English and Spanish and encouraged me to translanguage in my writing. During the spring of 2023, I was experimenting with Todres and Galvin's form of embodied poetry, in which I sought to collect experiences of bilingual people and distill them in poetic form. I also was writing about particularities of my own experience as an adult reflecting on a bilingual life, which has been characterized by entanglements of language, culture, and relationships.

Ms. Arevalo is not alone as she walks the school halls

A fifth grader's snack
after recess, Takis,
brought Nadia (meningitis, 1999) back.
But Nadia wasn't folding
paper with chili dust fingers.
Crunching, sweaty, eleven.

How could Danny (overdose, 2020)
be rushing out of PE?
When I caught up, it was a girl,
same spiky hair. "Excuse me,"
she said, surprised to see me running.
He'd been charming, too. Polite.

A boy Crocs across the classroom,
heels hovering as he walks.
Of course, it isn't Atticus (rope, 2008), who would be a man,
not seven again.
Not sharpening a pencil,
showing off the sharp tip.

I pass ghosts of myself in the stairwells, too:
headed to the copier that works,
counting pages out loud.

Checking my sick days balance,
both hands on the computer,
cell shrugged to my ear.

Cracking milk carton gables,
eating a stray chicken nugget.

Halfway through the staff potluck

I changed the card in
front of my full tray from
"*bizcochuelo marmolado*"
to "marble sponge."

Still no takers.

The card didn't say:
"My children brought *patotas de amigos* to our
blue Sotelo house for this cake."
Hay para todos, I'd say. *Vengan*.

or
"Tía Gloria baked this cake on the
Primus stove for every one of my birthdays. Imagine!"
Nunca le agarro la mano al horno.

"I suppose I'll freeze what's left.
There's too much for just me."

Lured by the dewiness of lemon squares,
my colleagues slid past the foreign,
strange and dry,
reaching for the lifeline of the familiar
made by Megan's collagen-rich hands.

Notes on "Form I-485, Required Initial Evidence to Adjust Residence Status"

Eliminate unnecessary captions such as,
"Gabe smiles as Silvia pours from her *abuela*'s blue teapot,"
but include things that constitute "objective proof"
such as receipts (gifts, jewelry, trips).

*The $23 jade plant from Grower's Outlet
cannot reasonably be considered a gift.
*This is not to be confused with a Green Card Receipt.

The things that constitute "objective proof" include
photos: family gatherings, sporting events, holidays.

*Only include pictures of
Silvia in the stands every Sunday
watching Gabe play at the YWCO
if they meet the criteria below:
The photo must show the couple together. And with others. Photo must be dated.

The things that constitute "objective proof" include
shared assets: property deeds, bank statements, car titles.

*Paperwork to adopt a seven year old
Schnauzer is not proof of anything.

Please delete
the eighty-seven-song playlist,
the recipe files for Torta Rogel,
The link to the blog "Visa my heart."
Language such as "beloved" is extraneous
in an official document.

*It goes without saying that all words should be in English.

After 6 years in Chicago, volvió al paisito con una wawa

747
Departure:
domestic, foreign.

Arriving, waiting, watching.

muesli, mami, abuela, helado
contemplando, convidando, conociendo, compartiendo.
Extranjera, lugareña.

Llegada.

X

Calendar shared with Leo, the only other profe de español at Peachtree Academy

enero
*vuelta al laburo el 2
Con gusto a poco.
It tasted like not enough.

febrero
*acordate q el 17 es el cumple de la jefa
Frío como saludo de suegra.
Chillier than your mother-in-law's belated birthday card.

marzo
*entrega de formularios para paseo de fin de año.
Más complicado que calzoncillo de pulpo.
Trickier than a squid's drawers.

abril
*conferencias de padres
Feo como pegarle a dios.
As hideous as hitting god.

mayo
*exámenes de fin de curso
Despistados como piojos en peluca.
Clueless like lice in a wig.

junio
*vacaciones de verano
¡La mar en coche!
As sweet as driving to the beach in a paid-for car!

julio
*vuelta al trabajo
Si el trabajo es salud, que trabajen los enfermos.
If work makes you healthy, the sick can have it.

agosto
*actualizar agendas
Más aburrido que bailar con la hermana.
Worse than prom with your sister.

septiembre
*webinar de seguridad laboral
Duro como turrón de oferta.
As stale as fruitcake from the clearance rack.

octubre
*nada
Lento como patada de astronauta.
Slow as 5k in space.

noviembre
*evaluaciones departamentales
Entre bomberos no nos vamos a pisar la manguera.
Between firefighters, let's not step on our hose.

diciembre
*aguinaldo
¿Quién te quita lo bailado?
Who can take from you what you have already enjoyed?

What Happened after My Parents Said a Chemistry Set Was Too Expensive

The day I bought an eyedropper
at Farmacia San Carlos with my own saved eight pesos,
I became a chemist.

First, I filled jars with things that were free:
fruit from the nispero tree,
a sandy cigarette butt,
eighteen rusty bottle caps.

Then, pipetting water from
sea, creek, rain, ditch, bath.

Other liquids made their way into my garden-shed lab:
bleach,
iodine,
vinegar,
whole milk,
a dribble of the dark milanesa oil saved between uses in a covered jar under the sink,
blue mimeograph fluid,
a sip of Coca-Cola from the bottom of a cup.

The tiny rubber bulb of the eyedropper sucked
acetone and vanilla out of their glass containers,
kerosene out of the heater,
soap suds from the concrete sink.

Swirl empty pill bottles with agua oxigenada,
see the scraps bloom and settle.
Add diluted Dettol to collected pencil shavings.
Decant over snail shells previously steeped in black tea.

Shake.

The day my mother threatened to throw it all out,
I decided to prove its worth, making an application.
Mix all in a pink bucket, spread it thick on my skin.

That's how I became famous in Barrio Atahualpa: as an accidental curandera.

Neighbors demanded to see the lighter spots on my knees and fingers,
where the warts had been burned off.

El almacenero asked if the slurry contained Fanta he'd delivered last week.
El quiosquero saved me a chicle Ploc.
Kids on the corner thought I could give a little more pa'l Judas.
El carnicero acted scared of my powers, and let me skip the line.
La peluquera asked my thoughts about caspa.
El panadero sang "sana, sana" when I walked through the curtain of colorful plastic strips.
El guarda del ómnibus pointed to an empty seat when I paid el boleto.

El verdulero insisted his figs did the trick, the rest was just marketing.

Sugerencias de maestras compañeras para que no sigas perdiendo embarazos

Dale un nombre con fuerza: Juana
Por las dudas, no te cortes el pelo.

Dale un nombre con garra: Tabaré.
No te pares en el umbral de la puerta.
Dale un nombre que lo ampare: Alejandro.
La naturaleza es sabia, a veces es así.

Dale un nombre alegre: Luciana.
Haceme caso, la criatura se da cuenta de lo que sentís.
Dale un nombre importante: Gonzalo.
Atate una cinta roja en la muñeca para prevenir el mal de ojo.
Dale un nombre interesante: Iñaki.
No dejes que nadie te toque la ropa. Por si acaso.

Dale mi nombre, así somos tocayas: María Pilar.
Poné una cuchara debajo de la cama.
Dale el nombre de un ángel que la cuide: Carmen.
No cruces las piernas que se enrosca la cuerda.
Dale un nombre del santoral: Catalina
(Te sacó la belleza, seguro que era nena).
Dale un nombre que la conecte a tu familia: Gloria
Asi querrá nacer.

Dale el nombre de tu marido: Roberto.
(Hay que ponerse a hacer los deberes).

Dale el nombre que diga lo que es: Milagros.

CHAPTER 6

DISCUSSION AND CONCLUSION

Understanding of/from the In-Between

This study sought to understand the experience of three DLI teachers at OES as they integrated theatre into their Spanish science lessons. Chapters 3 and 4 detailed findings related to student classroom engagement and teacher reflection as a result of the incorporation of drama into grade level science lessons. Bennett's vibrant materialism (2010) provided a framework for understanding the DLI class as an assemblage of things and relationships that continually interact and shift. Gloria Anzaldúa's understanding of *nepantla* (2015) informed my analysis of DLI teachers and their location between languages, disciplines, and cultures. Finally, enchantment, as theorized by Bennett (2002), is willingness to be open to surprise.

Taken together, the concepts of vibrant materialism, nepantla, and assemblage provide a robust theoretical grounding for knowing and being from a space of "in-between." Acknowledging the existential and epistemological realities of students and teachers in DLI classes as "in-between" could facilitate the opening of hybrid spaces between otherwise discrete subjects, languages, cultures, and ways of knowing. In a DLI school setting, an in-between view of the classroom as a whole could create a framework within which teaching and learning between traditionally demarcated spaces (Spanish/English, science/arts, home knowledge /academic knowledge, etc.) become more fluid. This understanding of/from the in-between assumes a continuum of identities, including home and school selves and an interconnectedness of ideas, things, and beings that leaves room for indeterminacy, surprise, and learning.

Educational spaces that allow for indeterminacy also create room for improvisation. This implies welcoming the unknown of the other's experience.

A classroom can be conceived of as an assemblage (Bennett, 2010), a confederation of individual parts that come together temporarily and have actancy separate from their individual components. Within an assemblage, there is a constant shifting between interacting agents as their relationships change. The assemblage implies a powerful shift in ontology in which "things—humans or otherwise—gain power and presence by virtue of the intensity emanating from assemblages" (Freeman, 2017, p. 89). Meaning is generated in "the middle" spaces "between things" (Deleuze & Guattari, 1987, p. 25) rather than solely from the components themselves. The elements in the classroom—teacher, students, scientific subjects, materials, and their relationships—act upon and with each other in the space of the in-between. When drama is introduced as a scientific modeling tool, children add their own sense of meaning by embodying their existing knowledge (Varelas et al., 2010), adding dimension to the experience of all those in classroom assemblage. The DLI science classroom is also a language learning environment and the gestures, linguistic and cultural tools, and entanglements that make up the in-between space must be considered (Gurney & Demuro, 2023; Pennycook, 2017).

Theatre activities had an impact on the DLI science classroom assemblage in part because student relationships of power were changed. As Roberto, Brian, Yeni, and other students added their voices, bodies, memories, and experiences to the assemblage, relationships between elements of the assemblage were created, modified, or reinforced. For example, the notion of expertise in the first grade lesson on "thermometer" went from a single student translating a word into English to students showing a wide variety of interpretations of the phenomenon of temperature. Including many experiences into the DLI science classroom is in

keeping with the motto of NGSS: “all students, all standards.” That is to say, in a science classroom, every student should be able to connect meaningfully with the content.

Theatre activities also had an impact on the DLI science classroom assemblage because of their impact on affective relationships between and among students. For example, Casey and Orlando, in second grade, understood that they had experiences of autumn in common. First grade students Maria and Ángel responded to each other in the wind activity, where Maria’s flapping arms represented the wind and Ángel showed how the wind acted upon the fabric of his clothes. Fourth graders built community and shared unique knowledge as they learned about Jesús and daylight patterns in his Venezuelan hometown, or the glacier shearing that Natalia could describe. While students acted and reacted as phenomena, they gained a feeling for the interconnectedness of material things such as wind and trees, magnets and refrigerators, rain and noise, ice and heat. Any perception that the class was “only playing” and not “really learning” could be dispelled by the formative and summative assessments teachers performed during and after theatre activities in which they saw evidence of Spanish and science vocabulary use and concept development.

In addition to the evidence that interactions between students grew richer through theatre-based science learning, teacher-student relationships were likewise positively impacted. Teachers intentionally sought to forge connections with students through “fun,” but there were also changes in teacher-student relational equity (DiGiacomo & Gutiérrez, 2016) as a result of these theatre activities. Sra. Mary, who described herself as “a little bit experimental,” relished being recast as a less important part of the assemblage with the increased participation of students. However, she acknowledged that “some teachers would really have a hard time with that.” The indeterminacy that characterizes theatre games meant that a teacher might not be able to predict

how many students would volunteer, how much time an activity would take, or what new information would come to light. Sra. Lana noted, "You don't know what's going to come out of a kid's mouth." For example, one first grade student said—in English—"It's sh***y outside" when Sra. Carla prompted, "*Como se dice* cloudy *en español*?" The outcomes of the "fun" activities could be unpredictable, and teachers needed to be ready to respond in unexpected ways.

Theatre activities further had an impact on the DLI science classroom assemblage because teachers' orientations toward their professional roles and responsibilities changed as a result of incorporating drama. There was an affective shift as the teacher reflected upon and reevaluated her position and task in the classroom. Sra. Carla moved from "NO!" to confidence as a science educator who integrated the arts. Sra. Lana felt that the centrality of her role as teacher was reinforced; seeing the possibilities of more student engagement motivated her to work harder. Sra. Mary felt relief at being decentered and relished being recast as a co-learner in a more symmetrical relationship, which Tabak and Baumgartner (2004) assert is unusual and particularly meaningful in the creation of student identities as scientists (p. 421).

Surplus of Significance: *La Rajadura*, Enchantment, "Yes, And…"

The process of arriving at an understanding of/from the in-between requires several steps. Anzaldúa's concept of *nepantla* provides a framework for acknowledging artificial dualities and developing a consciousness of existing on a continuum between binaries. Bennett describes the conditions within which an attitude of enchantment can flourish, leading to consciousness about the interconnectedness of things within an assemblage. In the following sections, the concepts of *la rajadura* (Anzaldúa, 2015) and enchantment (Bennett, 2002) are illuminated by connections to

the "yes, and" maxim of improvisational theatre. Taken together, these three concepts echo the inclusive, student-centered approach of additive bilingualism (Tedick & Lyster, 2020).

Beeman and Urow (2013) begin the DLI teacher handbook *Teaching for Biliteracy* with a series of statements, the first of which is "Spanish in the United States is a minority language within a majority culture" (p. 5). Spanish/English, minority/majority and other binaries are frequent in discussions of DLI. Gloria Anzaldúa offers the tool of imagining a space in between these dualisms. She theorized borderlands as places where conflicting ways of being came into contact, calling dualisms into question by naming the space using the Nahuatl word for "in-between": *nepantla* (2012). The *nepantlera* is the person who has moved from either/or thinking about the border to "in-between" consciousness, who guides others as she transcends binaries and boundaries, creating space for a surplus of significance. The *nepantlera*'s work of finding, defining, and holding space in between borders is arduous, but it can be fueled by creativity and relationships (Anzaldúa, 2015). Mignolo (2012) defines "border thinking" as "thinking from dichotomous concepts rather than ordering the world in dichotomies" (p. 85). Ghiso and Campano (2013) apply "border thinking" to bilingual education, providing a framework for schools to recognize the diversity of student experiences by welcoming home knowledge into the classroom, which added significance to the learning experience for the class as a whole.

The teachers who participated in this study reflected on their work as science teachers in light of the theatre activities. The act of reflection itself was an opportunity for teachers to pause and observe from "in-between" identities, as they considered themselves in-between instructors and observers, theatre and science facilitators, language and content teachers. Anzaldúa's Borderland theory tries to create space for in-between-ness, what she calls "a perspective from the cracks" (2012, p.79). *La rajadura* (the crack, or the slash) is the disruptor of dualistic thought

and serves as a metaphor for additive identities. The slash in between identities becomes "increasingly permeable" (p. 81), opening spaces for additive significance.

When a teacher encourages her students to access their home knowledge, experience, language, she is valuing the student's life outside of school and making a statement against school-sponsored cultural hegemony (Lu, 1990). Flores and Rosa (2015) point out that how teachers "hear" language practices of multilingual students is as important as how students "speak." Language teachers can perpetuate harm by uncritically following "language ideologies of the white listening subject" (p. 151), focusing on the linguistic practices of speakers without also considering how the hearer is perceiving the accent, words, and body of the speaker. Flores and Rosa invoke Anzaldúa when arguing that adding proficiency skills to language learners' repertoires will never be enough to disrupt "the racialized hierarchy of U.S. society" (p. 167). Rather than exclusively focusing on the linguistic use of the student speaker, their model calls for teachers to listen more carefully to in-school experiences of linguistically minoritized students: long-term English learners, Heritage language speakers and African American English speakers. In a later article, Rosa and Flores (2023) assert that a raciolinguistic framing of language education "interrogates the fundamental relationship between linguistic and racial classifications, thereby refusing to separate the study of languages from the experiences, positionalities, perspectives, and political projects of their users" (p.110). Teachers who place student experience at the center of the language class are making an important choice: valuing the embodied, material, racialized, minoritized, and/or linguistic identities of language learners. This pedagogical framing, in turn, facilitates understanding in/from the in-between and adds a surplus of significance to the learning experience.

The invitations to embody scientific phenomena changed how teachers "listened" to students. As Sras. Carla, Lana, and Mary engaged students in drama in their Spanish science classes, they encouraged students to express themselves in ways that cut across binaries: home/school, science/art, and English/Spanish. Prioritizing a student's connection to the phenomenon rather than focusing on the language and words that described the experience represents a shift from focusing on the language in the abstract to understanding language as connected to the experiences of its users. Peer-to-peer and teacher-student relations became more interactive as the listening teacher modeled possibilities of revelation, reaction, and response. Drama and improv activities kindled dialogic, joyful learning for teachers and students.

The teachers experienced surprise and wonder as they brought drama activities into their classrooms. This experience of surprise and awareness of being in-between conventionally separated spaces is related to *nepantla* (Anzaldua, 2015) and enchantment (Bennett, 2002). Both Bennett and Anzaldúa describe developing consciousness moments in which there is disruption of boundaries. In the context of this study, the boundaries between which the teachers found themselves were those of students home knowledge/academic knowledge, English/Spanish, arts/core subjects. The *nepantlera* is the person who is conscious of existing in-between binaries. This form of consciousness closely aligns with what I refer to as understanding of/from the in-between. Being open to developing understanding of/from the in-between requires a kind of noticing that Bennett calls enchantment.

The Spanish phrase *me encanta* is sprinkled throughout the interviews and the classroom practices: it was used by teachers, students, and myself. While the more common English translation would be "I love it," I was attuned to the English word "enchantment" and the

ubiquity of the word *encanto* (delight) in the classroom conversations because of Jane Bennett's theorizing of enchantment.

Bennett points to the importance of noticing and developing "modes of enchantment" without which "we might not have the the energy and inspiration to enact ecological projects, or to contest ugly and unjust modes of commercialization, or to respond generously to humans and nonhumans that challenge our settled identities" (2002, p. 174). For Bennett, humans practice this willingness to be enchanted and open through the arts. She suggests that language, poetry, images, and words are vibrant matter within the research assemblage (2020, p. xxii). The material world is an integral part of the influx and efflux that moves and modifies the "writer self," the "creative I" (2020, p. 117). Enchantment is an encounter with wonder, born of a willingness to engage with and be surprised by things. In one explanation, she describes enchantment as "saying 'yes' to the world," choosing "joyful attachment," and being moved to ethical behavior because of engagement with the other (2020, p. 4). This being attached to things has ethical implications: interest leads to obligation and care, enlarging the assemblage of relationships. Cultivating an environment of enchantment enlivens the in-between spaces in the classroom, making way for various surpluses of significance.

It may be a coincidence that the language of "saying 'yes' to the world" is similar to the "yes, and" maxim of improv. Comedian and writer Tina Fey describes "yes, and" as the foundation of a collaborative, creative ensemble. She writes "YES, AND means don't be afraid to contribute. It's your responsibility to contribute. Always make sure you're adding something to the discussion. Your initiations are worthwhile" (Fey, 2011, p. 85). Cahnmann-Taylor and McGovern (2021) define applying the practice of "yes, and" in the language classroom as "the skill of building on what speakers and listeners do in real-time interactions" (p. 14). Within the

OES classes, teachers "listened" to students with a "yes" attitude: the goal of initiating science class with student experiences was to affirm student identities rather than correct science notions or language use. For Fey (2011), implicit in "yes, and" is a generous view of what is "correct." Playing theatre games and embodying science content through dramatic interpretation cultivated both a "yes to the world" and "yes, and" ethos among teachers and students.

Teachers' engagement with drama activities propelled them to moments of wonder and willingness to engage. Bennett argues that being willing to engage with the unknown implies a respect and interest in the material world that is outside of the self (2002). The teachers were willing to say yes to this study, to working with me in co-planning and co-teaching lessons with arts-integrated components, and to including theatre activities in their science classes. Throughout the process they exhibited "joyful attachment" to their students, their classrooms, the subject of science, and me. They were sometimes surprised, as detailed above. This surprise is in itself an ethical generosity because it implies an acceptance of indeterminacy of the other.

Embodied, Entangled, Enlivened: Research of/from the In-Between

This study considered the components of the assemblage as they related to one another and acted upon each other, including the lively artifacts of classroom and cultural practices as well as artistic, linguistic, and disciplinary (scientific) practices. Among all this vibrant interplay, the embodied selves of the teacher and researcher were profoundly important. Research of/from the in-between notes the strange role of social science in educational inquiry by acknowledging the interconnectedness of human, affective, material, cultural, and artistic elements.

As a researcher, I was included in the study. It was important to acknowledge the impact I had on the assemblage. My presence was material and brought with it its own stories.

When I was in a classroom with a teacher, our roles and relationships overlapped. There are many entanglements present in schools, where the demarcations between coworkers, support staff, and researchers are not always clearly defined. Our relationship as researcher and research participant were similarly entangled as we continued observing, planning, teaching, and evaluating together.

While my unique physical presence was felt in the assemblage as I moved through the class and interacted with students, the phenomenological research process allowed for another type of embodied entanglement. Through the interviews and poetic reflections, participants shared their realities with me, and I sought to deeply understand them through embodied interpretation, holding their experiences in my body and recreating them through poetic interpretation (Todres & Galvin, 2008).

Acknowledging the humanity and materiality of myself and my relations with every element in the study has reinforced to me the importance of the theoretical and methodological framework of this project. It was impossible for me to conduct research as an outside observer, just as it was existentially impossible for me to consider my separation from the material of the study. In the tradition of Anzaldúa and Bennett, I am ontologically and materially connected to every element in this study: teachers, students, language, culture, and science. Methodologically, I am entangled, invested, and embodied in the stories of the bilingual teachers at OES, which are particularly theirs but also part of the human experience. In the words of Violeta Parra (1966), *"el canto de ustedes, que es mi propio canto"* ("your song, which is my own song").

Conclusion

Integrating theatre into the DLI science lessons changed the classroom assemblage. Sras. Carla, Lana, and Mary described common findings across first, second, and fourth grades at OES.

Student engagement with science increased as students connected their home knowledge with scientific phenomena by creating embodied dramatic narratives. Community developed within the classroom as more students interacted with the material and responded to each other in collaborative activities. Teachers and other students mediated Spanish learning by adding verbal labels to acted-out phenomena, but language production was not a prerequisite to meaningful class participation.

Teachers were gratified to see students enjoying the lessons and were sometimes surprised by information that disrupted existing boundaries. Because of the positive results in student performance and engagement, teachers were motivated to continue using theatre activities in their science lessons, and both teachers and students expressed enjoyment at the chance to employ drama in the classroom. However, it was important for teachers to recognize the indeterminacy of human actors and the possibility of revelation, questions, and other student-driven entanglements that could affect the lesson. Finally, theatre games provided opportunities for teachers to position themselves as learners and participants alongside the students. This was a chance for teachers to take an "in-between" perspective and view their position in the assemblage as complex, shifting, and interconnected.

There were many opportunities to see how using theatre in the DLI Spanish science class shifted relationships and connections within the classroom assemblage as players interacted. At the same time, drama activities provided opportunities to disrupt boundaries as students used a different modality to communicate science knowledge. Rather than existing between rigid disciplinary borders, students and teachers explored the permeable continuity between science and art, English and Spanish, language and gesture.

Limitations and Future Research

The expectations of phenomenological projects are great, according to Max van Manen (2016). A phenomenological study must be born of engagement with a personally meaningful and situated subject, and it must illuminate the question "What is it like?" for someone to have the particular experience that is being studied (2016, p. 42). Fundamentally, the study must be concerned with significance and must seek fulfillment for humans (p. 12). As a result, the study is limited in its scope. This study was always relational and pedagogical, focused on educators' experiences in a forward-looking sense. I hoped to empower teachers in their Spanish science classrooms and create opportunities for joy, learning, and reflection through our interviews. This study never pretended to be a needs assessment of the OES DLI program or an analysis of what qualities a successful DLI teacher should possess.

There are important issues facing DLI programs in Georgia, especially programs in small districts such as CSD. The primary issue is staffing, and this is in line with current research (Hood, 2020). My anecdotal observations over the last three years have shown an increase in bilingual student teachers, but these have not coincided with applications for DLI job postings at our school. Because CSD has a charter district designation, it is able to hire uncertified teachers provisionally and enroll them in the Georgia Teacher Academy for Preparation and Pedagogy (GaTAPP), an alternative certification program. The barrier for Spanish-speaking teachers is the requirement that these postulants pass the Georgia Assessment for Certification for Educators (GACE) exam. Without a passing score, provisionally hired, uncertified teachers cannot enroll in the GaTAPP program and are in a professional gray area: they are not Georgia educators and they cannot be trained to be Georgia educators. As a result, the Spanish-speaking teachers have been hired to teach in DLI classes because of their Spanish skills. However, their English-

language proficiency may be a barrier to passing the GACE, and they are unable to access pedagogical training that would be useful in a Georgia school context. Since the beginning of DLI at OES, there have been full-time teachers who have been unable to pass the GACE because of language barriers and thus unable to enroll in GaTAPP. Some of these teachers have had educational training in their home country and some have not. This is an area for further study. A phenomenological study of this subject might design a GACE preparation program for Spanish-speaking teachers or a GaTAPP alternative that provides Spanish language pedagogy resources for provisionally certified teachers who need support in classroom management and planning.

In my own work, I want to speak Spanish and laugh every day. There are a lot of jobs that can make this dream a reality for me, but for the moment, I would like to stay at OES in a more formal position. To this end, I took the Elementary Education GACE in February 2024, and prepared test-taking materials based on my experience for student teachers and provisionally certified Spanish-speakers who were registered to take the test in Spring 2024. I have also enrolled in an online Elementary Education Certification program that will conclude in August 2024. For now there is no job posted at OES, but should a position as DLI coordinator or coach become available, I would pursue that option.

In the future, I would like to continue researching with and about bilingual students and teachers. Because my path to Georgia teacherdom has been circuitous, I am committed to establishing myself as a certified Georgia educator, and from there working to create helpful avenues for other Spanish-speaking teachers to enter the profession.

Before embarking on this dissertation, I asked in my comprehensive exams: “How can research that is planned, controlled, and asserts what is ‘known’ harness the experience of connection and revelation? Given that educators are required to produce and interact with

research and data daily, how can scholarship be generated and presented in ways that are fresh and make space for all areas of pedagogical experience?" I am grateful to the generous and linguistically engaged theoretical approaches that Bennett and Anzaldúa provided, which honored the particularities of experience, language, and materiality. The life-giving methods of phenomenological research and embodied poetic inquiry fostered meaningful, reflective connections with DLI teachers. These research activities mixed with lively classroom theatre practices and an emphasis on engaging all science learners fomented more inclusive and responsive environments. It is because of these methods, theories, and pedagogies in concert that I have been able to write this dissertation as myself, in-between the continua of English/Spanish, arts/science, sand/city, student/*maestra*, researcher/data, novice/expert, American/*uruguaya*.

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APPENDICES

APPENDIX A

SCRIPTED ANNOUNCEMENT FOR PARTICIPANT RECRUITMENT

English Translation

Read Aloud in Staff Meeting, July 30, 2023

Dear Otis Avenue Elementary School DLI teachers,

You are invited to participate in a research study. The research project is entitled " Arts Based Approaches to STEM Learning in a DLI Setting." This study has been approved by the Southeastern University, CSD and Mr. Coke. I will read you the study procedures and time commitment information:

Study Procedures and Time Commitment

We are doing a research study to find out what it is like to facilitate bilingual creative expression activities in a DLI classroom and how you feel they affect your teaching and your students' learning. We are asking you to be in the study because you are a DLI teacher at OES and your class engages in creative activities. If you agree to be in the study, you will let us use your answers to questions about how you felt about using creative class activities for research. You will let us watch you and take notes while you are teaching and planning. You will let us use pictures of your teaching, planning and creative work.

At the end of the classroom activity, you will be interviewed. The interview will be recorded using transcription software. The process time to read the directions, ask the question and for you to answer the question is expected to take an hour. You may choose to skip the interview or answer the question in writing.

If you are interested in participating, please read the form in your mailbox carefully, fill in the form and return to ed86634@uga.edu. If you have any questions, please contact Elizabeth Dubberly or Dr. Cahnmann-Taylor.

Spanish Translation

Estimadas Maestras de DLI de Otis Elementary School,

Les invito a leer la carta adjunta referente al proyecto de investigación que se titula "Aprendizaje STEM basado en las Artes en un contexto de doble inmersión." Este estudio ha sido avalado por

la Universidad Sudeste, el distrito escolar y el Sr. Coke. A continacion leer un poco más sobre los procedimientos y el compromiso de tiempo:

Procedimientos de estudio y compromiso de tiempo

Estamos realizando un estudio de investigación para descubrir cómo es facilitar actividades de expresión creativa bilingüe en un aula DLI y cómo cree que afectan su enseñanza y el aprendizaje de sus estudiantes. Le pedimos que participe en el estudio porque es profesor de DLI en OES y su clase participa en actividades creativas. Si acepta participar en el estudio, nos permitirá usar sus respuestas a las preguntas sobre cómo se sintió acerca del uso de actividades creativas de clase para la investigación. Nos permitirá observar y tomar notas mientras enseña y planifica. Nos permitirá utilizar fotografías de tu enseñanza, planificación y trabajo creativo.

Al finalizar la actividad de aula, ud. será entrevistada. La entrevista se grabará mediante un software de transcripción. Se espera que el tiempo del proceso para leer las instrucciones, hacer la pregunta y usted responder la pregunta sea de una hora. Puede optar por saltearse la entrevista o responder a las preguntas por escrito.

Si le interesa participar, por favor lea con cuidado la información en su casillero, llene el formulario y devuelvalo a ed86634@uga.edu. Si tiene alguna pregunta, por favor póngase en contacto con Elizabeth Dubberly o la Dra. Cahnmann-Taylor.

APPENDIX B

TEACHER CONSENT FORM

English Translation

University of Georgia Participant Consent Form (Teacher)

Bilingual Creative Activities and Academic Enhancement in a DLI Setting

Researcher's Statement

You are being asked to take part in a research study. The information in this form will help you decide if you want to be in the study. Please ask the researcher(s) below if there is anything that is not clear or if you need more information.

Principal Investigator: *Melisa Cahnmann-Taylor cahnmann@uga.edu*

Co-investigator: Elizabeth Dubberly ed86634@uga.edu
Department: Language and LIteracy Education

- Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled
- This study will take place during the 2022-2023 and 2023-2024 school years and will require work outside with the researcher outside of regular classroom planning and assessment.
- Teachers who participate will be interviewed about their experience as bilingual teachers, as teachers using arts-based pedagogies and working within the framework of the NGSS.

You are being asked to participate because you are a teacher in a Dual Language Immersion Program who teaches bilingual students and uses creative expression activities to meet Science standards.

If you are interested in participating in the study, please read the additional information on the following pages, and feel free to ask questions at any point.

Study Procedures and Time Commitment

We are doing a research study to find out what it is like to facilitate bilingual creative expression activities in a DLI classroom and how you feel they affect your teaching and your students' learning. We are asking you to be in the study because you are a DLI teacher at OES and your class engages in creative activities. If you agree to be in the study, you will let us use your

answers to questions about how you felt about using creative class activities for research. You will let us watch you and take notes while you are teaching and planning. You will let us use pictures of your teaching, planning and creative work.

At the end of the classroom activity, you will be interviewed. The interview will be recorded using transcription software. The process time to read the directions, ask the question and for you to answer the question is expected to take an hour. You may choose to skip the interview or answer the question in writing.

Risks and Discomforts

There are no foreseeable risks.

Benefits

Being in this study may improve your feelings about your English and Spanish teaching, learning and planning. We also hope to learn things about creativity and classwork that will help other children and teachers in the future.

Confidentiality of Records

Your identity and privacy is very important. We will not use your name on any papers that we write about this project. When we collect data, we will code it with numbers so that other people cannot tell who you are.

The interview recording will be transcribed and the voice recording will be saved until the end of the study (on or before December, 2024). At that time, the voice recording will be destroyed. The voice recording and the transcript will be associated with a pseudonym. All identifying information will be removed.

Transcripts and data and will not be shared with other researchers.

You can ask any questions that you have about this study. If you have a question later that you didn't think of now, you can ask us next time. You can email at cahnmann@uga.edu

Participant Rights

If you have any questions or concerns regarding your rights as a research participant in this study, you may contact the Institutional Review Board (IRB) Chairperson at 706.542.3199 or irb@uga.edu.

If you agree to participate in this research study, please sign below:

Please keep one copy and return the signed copy to the researcher.

Spanish Translation

University of Georgia Formulario de Consentimiento del Participante (Maestra)

Actividades creativas bilingües y mejora académica en un entorno DLI

Declaración del investigador

Se solicita su participación en un estudio de investigación. La información en este formulario lo ayudará a decidir si desea participar en el estudio. Pregunte a los investigadores a continuación si hay algo que no esté claro o si necesita más información.

Investigador principal: *Melisa Cahnmann-Taylor cahnmann@uga.edu*

Co-investigador: Elizabeth Dubberly ed86634@uga.edu

Departamento: Educación en Idiomas y Alfabetización

- Su participación en el estudio es voluntaria y puede optar por no participar o suspenderlo en cualquier momento sin penalización ni pérdida de los beneficios a los que de otro modo tiene derecho.
- Este estudio se llevará a cabo durante los años escolares 2022-2023 y 2023-2024 y requerirá trabajo al aire libre con el investigador fuera de la planificación y evaluación regular del aula.
- Los docentes que participen serán entrevistados sobre su experiencia como docentes bilingües, como docentes que utilizan pedagogías basadas en las artes y trabajan en el marco de la NGSS.

Se solicita su participación porque es maestra en un programa de inmersión en dos idiomas que enseña a estudiantes bilingües y utiliza actividades de expresión creativa para cumplir con los estándares de ciencias.

Si está interesado en participar en el estudio, lea la información adicional en las siguientes páginas y no dude en hacer preguntas en cualquier momento.

Procedimientos de estudio y compromiso de tiempo

Estamos realizando un estudio de investigación para descubrir cómo es facilitar actividades de expresión creativa bilingüe en un aula DLI y cómo cree que afectan su enseñanza y el aprendizaje de sus estudiantes. Le pedimos que participe en el estudio porque es profesor de DLI en OAES y su clase participa en actividades creativas. Si acepta participar en el estudio, nos permitirá usar sus respuestas a las preguntas sobre cómo se sintió acerca del uso de actividades creativas de clase para la investigación. Nos permitirá observar y tomar notas mientras enseña y planifica. Nos permitirá utilizar fotografías de tu enseñanza, planificación y trabajo creativo.

Al finalizar la actividad de aula, ud. será entrevistada. La entrevista se grabará mediante una aplicación de transcripción. Se espera que el tiempo del proceso de la entrevista será de una hora. Puede optar por saltearse la entrevista o responder a las preguntas por escrito.

Riesgos y malestares

No hay riesgos previsibles

Beneficios

Participar en este estudio puede mejorar sus sentimientos sobre la enseñanza, el aprendizaje y la planificación de inglés y español. También esperamos aprender cosas sobre la creatividad y el trabajo en clase que ayudarán a otros niños y maestros en el futuro.

Confidencialidad de los registros

Su identidad y privacidad son muy importantes. No utilizaremos su nombre en ningún documento que escribamos sobre este proyecto. Cuando recopilemos datos, los codificaremos con números para que otras personas no puedan saber quién es usted.

La grabación de la entrevista se transcribirá y la grabación de voz se guardará hasta el final del estudio (en diciembre de 2024 o antes). En ese momento, la grabación de voz será destruida. La grabación de voz y la transcripción irán asociadas a un seudónimo. Se eliminará toda la información de identificación.

Transcripciones y datos y no se compartirán con otros investigadores.

Puede hacer cualquier pregunta que tenga sobre este estudio. Si tiene alguna pregunta más adelante que no pensó ahora, puede preguntarnos la próxima vez. Puede enviar un correo electrónico a ed86634@uga.edu.

Derechos de los participantes

Si tiene alguna pregunta o inquietud sobre sus derechos como participante de la investigación en este estudio, puede comunicarse con el presidente de la Junta de Revisión Institucional (IRB) al 706.542.3199 o irb@uga.edu.

Si acepta participar en este estudio de investigación, firme a continuación:

Elizabeth Dubberly	_____	_____
Nombre del Investigador	Firma	Fecha
_____	_____	_____
Nombre del participante	Firma	Fecha

Guarde una copia y devuelva la copia firmada a la investigadora.

APPENDIX C

PROTOCOL FOR INTERVIEW 1

English Translation

Introduction
Hello. Thank you for participating in the interview today. Thank you for signing the consent form and agreeing to be a part of this study.

Purpose
The purpose of this study is to explore your experiences of being a DLI teacher using arts based pedagogies in Science class (RQ1). This first interview is to think together about things that might have shaped your experience as a bilingual person, as a teacher, as someone who is creative and uses art and as someone who lives on the earth at this moment in time. These are all parts of your experience that I am interested in.

RQ1:What are the qualities of the experience of teachers who use arts-based pedagogies in DLI Science class?
RQ2: What linguistic, cultural and artistic resources are employed by teachers that use arts based methods in the STEM classroom?
RQ3: What are the human and material entanglements in a DLI Science classroom ?

If you feel uncomfortable at any time in the interview, you are welcome to withdraw your participation with no penalty. You can also choose to think about a particular question for as long or as little as you wish or not answer it for any reason. These questions are starting points for our conversation about you and your experience.

Ground Rules
There are no right or wrong answers. I am interested in learning about your experience using arts-based pedagogies to teach Science in the DLI classroom.

I will ask questions to prompt our conversation and use images and artifacts from our arts-based classroom activities to guide our conversation. You can feel free to take time to answer the question or refer to anything else that the question prompts in your experience. You can answer in English or Spanish or switch back and forth between languages.

Terminology
Arts-Based Pedagogy: Teaching using arts-based methods.
Arts-Based Research: Doing research using arts based methods. Gathering, organizing or interpreting data using photography, poetry or another arts method is arts-based research.
Photo-Elicitation: Asking someone to take and select pictures and then tell you what they mean.
Curate: Selecting and putting together art, itself an art form.

Initial Interview Questions

1. What is it like for you to be a DLI teacher?
2. What do you think people don't know about being a DLI teacher?
3. How have the circumstances of your life brought you to being a DLI teacher?
4. Have you come close to leaving teaching?
5. Can you tell me about a specific episode where you were trying to teach science in Spanish that you remember vividly?

A. Personal Background
    1. Please tell me your name and spell it for me.
    2. What is your age or age range?
    3. Where did you grow up?
    4. What kind of school did you go to when you were a child?
    5. What is your family background?
    6. What brought you to Athens, GA?
    7. How long have you lived here?
    8. How do you feel about Athens, GA?
    9. Are there other places that you have lived?
    10. Is there another place (or places) that is home to you?
    11. What does the experience of being bilingual mean to you?

B. DLI Teaching
    1. What is your current job title?
        a. How long have you worked at this job?
        b. How do you feel about this job?
        c. Can you tell me what it is like to do this job?
    2. How long have you been a teacher?
        a. Where did you train to be a teacher?
        b. When was that?
        c. What populations did you plan to work with?
        d. Did those qualifications prepare you for this job?
            1. Did you need to retrain?
            2. What was that like?
    3. What have some of your jobs been?
    4. What in your background interested you in this job?
    5. How do you think that DLI is different from other teaching experiences?
    6. What life experiences drew you to be a DLI teacher?
    7. Has being a DLI teacher impacted your thoughts about the world?
    8. Has being a DLI teacher impacted your ideas about teaching and learning?
    9. How has being a DLI teacher impacted your life?
    10. Have you come close to leaving teaching?

C. Science Teaching
    1. How do you feel about teaching science in Spanish?
    2. What does teaching science mean to you?

3. Can you tell me about a specific episode where you were trying to teach science in Spanish that you remember vividly?
4. Is there an experience of the nature or science that you would like to incorporate into your classroom ?
5. What in your experience informs your thoughts about teaching science?

D. Arts/Arts Integration
    1. Can you describe an arts or creative experience that you have had that was important to you?
    2. Would you tell me about your own experience of learning with the arts, or arts based teaching?
    3. What role do you think the arts currently play in the classroom?

E. Word Associations
    1. What emotions do the words "science class" evoke?
        1. Teaching science makes me feel….
        2. Learning science makes me feel…
        3. Doing science makes me feel…
    2. What about the phrase "Science Milestones test"?
    3. What are some verbs and nouns that you associate with teaching science?
    4. What images come to mind when you think of teaching science?
    5. If you close your eyes, what sounds do you hear when you imagine science class?
    6. Is there a natural force or pattern with which you identify?

Spanish Translation

Introducción
Hola. Gracias por participar en la entrevista de hoy. Gracias por firmar el formulario de consentimiento y aceptar ser parte de este estudio.

Objetivo
El propósito de este estudio es explorar sus experiencias como maestra de DLI utilizando pedagogías basadas en las artes en la clase de Ciencias (RQ1). Esta primera entrevista es para pensar juntos sobre las cosas que podrían haber dado forma a su experiencia como persona bilingüe, como maestra, como una persona creativa y como alguien que vive en la tierra en este momento. Todas estas son partes de tu experiencia que me interesan.

Las preguntas que guían esta investigación son las siguientes:
RQ1:¿Cuáles son las cualidades de la experiencia de los docentes?que utilizan artes basadas pedagogías en la clase de Ciencias DLI?
Pregunta 2: ¿Qué recursos lingüísticos, culturales y artísticos emplean los profesores que utilizan métodos basados en las artes en el aula STEM?
RQ3: ¿Cuáles son los enredos humanos y materiales en un aula de Ciencias DLI?

Si en algún momento de la entrevista se siente incómoda, puede retirar su participación sin penalización. También puede optar por pensar en una pregunta en particular durante el tiempo que desee o no responder por cualquier motivo. Estas preguntas son puntos de partida para nuestra conversación sobre usted y su experiencia.

Reglas de juego
No hay respuestas correctas o incorrectas. Me interesa conocer su experiencia utilizando pedagogías basadas en las artes para enseñar ciencias en el aula DLI.

Haré preguntas para impulsar nuestra conversación y usaré imágenes y artefactos de nuestras actividades artísticas en el aula para guiar nuestra conversación. Puede tomarse el tiempo para responder la pregunta o hacer referencia a cualquier otra cosa que la pregunta le indique en su experiencia. Puede responder en inglés o español o alternar entre idiomas.

Terminología
Pedagogía basada en las artes: enseñanza utilizando métodos basados en las artes.
Investigación basada en las artes: realizar investigaciones utilizando métodos basados en las artes. Recopilar, organizar o interpretar datos utilizando fotografía, poesía u otro método artístico es una investigación basada en las artes.
Foto-Elicitación: pedirle a alguien que tome y seleccione fotografías y luego le diga lo que significan.
Curar: Seleccionar y montar arte, en sí mismo una forma de arte.

Preguntas iniciales de la entrevista
1. ¿Cómo es para ti ser profesor de DLI?
2. ¿Qué crees que la gente no sabe acerca de ser maestra de DLI?
3. ¿Cómo las circunstancias de tu vida te han llevado a ser maestra de DLI?
4. ¿Has estado cerca en algún momento de dejar la docencia?
5. ¿Puedes contarme sobre un episodio específico en el que enseñaste ciencias en español que recuerdes vívidamente?

A. Experiencia personal
    1. Por favor díme tu nombre y deletrealo.
    2. ¿Cuál es tu edad o rango de edad?
    3. ¿Dónde creciste?
    4. ¿A qué tipo de escuela fuiste cuando eras niña?
    5. ¿Cuál es tu origen familiar?
    6. ¿Qué te trajo a Atenas, GA?
    7. ¿Cuánto tiempo has vivido aquí?
    8. ¿Cómo te sientes acerca de Atenas, GA?
    9. ¿Hay otros lugares donde has vivido?
    10. ¿Hay otro lugar (o lugares) que sea tu hogar?
    11. ¿Qué significa para ti la experiencia de ser bilingüe?

B. Enseñanza DLI
    1. ¿Cuál es tu título de trabajo actual?

a. ¿Cuánto tiempo lleva trabajando en este trabajo?
b. ¿Cómo te sientes acerca de este trabajo?
c. ¿Puedes decirme cómo es hacer este trabajo?

2. ¿Cuánto tiempo llevas siendo profesor?
   a. ¿Dónde te formaste para ser profesor?
   b. ¿Cuándo fue eso?
   c. ¿Con qué poblaciones planeaste trabajar?
   d. ¿Esas calificaciones lo prepararon para este trabajo?
      1. ¿Necesitabas volver a capacitarte?
      2. ¿Cómo fue eso?
3. ¿Cuáles han sido algunos de tus trabajos?
4. ¿Qué en tu experiencia te interesó en este trabajo?
5. ¿En qué crees que se diferencia DLI de otras experiencias docentes?
6. ¿Qué experiencias de vida te llevaron a ser profesora de DLI?
7. ¿Ser profesor de DLI ha impactado tus pensamientos sobre el mundo?
8. ¿Ser profesor de DLI ha impactado sus ideas sobre la enseñanza y el aprendizaje?
9. ¿Cómo ha impactado en tu vida ser profesor de DLI?
10. ¿Has estado cerca de dejar la docencia?

C. Enseñanza de las ciencias
   1. ¿Cómo te sientes acerca de enseñar ciencias en español?
   2. ¿Qué significa para ti enseñar ciencias?
   3. ¿Hay alguna experiencia de la naturaleza o de la ciencia que te gustaría incorporar a su salón de clases?
   4. ¿En su experiencia, qué influye en tus pensamientos sobre la enseñanza de ciencias?

D. Integración de artes/artes
   1. ¿Puedes describir una experiencia artística o creativa que hayas tenido y que haya sido importante para ti?
   2. ¿Me contarías sobre tu propia experiencia de aprendizaje con las artes o de enseñanza basada en las artes?
   3. ¿Qué papel crees que juegan actualmente las artes en las aulas?

E. Asociaciones de palabras:
   1. ¿Qué emociones evocan las palabras “clase de ciencias”?
      1. Enseñar ciencias me hace sentir….
      2. Aprender ciencias me hace sentir...
      3. Hacer ciencia me hace sentir...
   2. ¿Qué te provoca la frase “Science Milestones Test en Quinto Grado”?
   3. ¿Cuáles son algunos verbos y sustantivos que asocia con la enseñanza de las ciencias?
   4. ¿Qué imágenes te vienen a la mente cuando piensas en enseñar ciencias?
   5. ¿Si cierras los ojos, qué sonidos escuchas cuando imaginas la clase de ciencias?
   6. ¿Existe alguna fuerza o patrón natural con el que te identificas?

APPENDIX D

PHOTO ELICITATION INVITATION

English Translation

Introduction

Hello. Thank you for participating in this research study. Thank you for signing the consent form and agreeing to be a part of this study.

Purpose

The purpose of this study is to explore your experiences of being a DLI teacher using arts based pedagogies in Science class (RQ1).

As we plan and teach our Arts-Based Science lesson, please take photos of things that you find interesting along the way. We can compare notes about our experiences at our next interview.

RQ1:What are the qualities of the experience of teachers who use arts-based pedagogies in DLI Science class?
RQ2: What linguistic, cultural and artistic resources are employed by teachers that use arts based methods in the STEM classroom?
RQ3: What are the human and material entanglements in a DLI Science classroom ?

If you feel uncomfortable at any time in the interview or with the activity, you are welcome to withdraw your participation with no penalty. You can also choose to think about a particular question for as long or as little as you wish or not answer it for any reason. These questions are starting points for our conversation about you and your experience.

Ground Rules

There are no right or wrong answers. I am interested in learning about your experience using arts-based pedagogies to teach Science in the DLI classroom.

I will ask questions to prompt our conversation and use images and artifacts from our arts-based classroom activities to guide our conversation. You can feel free to take time to answer the question or refer to anything else that the question prompts in your experience. You can answer in English or Spanish or switch back and forth between languages.

Terminology

Anecdote: Story based on my observations and notes.
Arts-Based Pedagogy: Teaching using arts-based methods.
Arts-Based Research: Doing research using arts based methods. Gathering, organizing or interpreting data using photography, poetry or another arts method is arts-based research.

Photo-Elicitation: Asking someone to take and select pictures and then tell you what they mean.
Curate: Selecting and putting together art, itself an art form.
What you can expect at our next interview:

Photo Elicitation Interview

I am going to ask you to select a few photos and show them to me in the order you choose. You can tell me anything you want about the photo and what it means to you. The photos are meant to serve as prompts for your memory of the experience and to help you process what it was like to prepare and teach the lesson. I will ask you follow up questions.

I will record the interview and save the photos with the interview. This information will be safely stored on my phone which is passcode protected. I will download and transcribe the interview with a pseudonym to the hard drive of my computer and will not be linked to your name or the names of your students.

I will have some anecdotes to share with you at the end.

Spanish Translation

Introducción
Hola. Gracias por participar en este estudio de investigación. Gracias por firmar el formulario de consentimiento y aceptar ser parte de este estudio.

Objetivo
El propósito de este estudio es explorar sus experiencias como profesor de DLI utilizando pedagogías basadas en las artes en la clase de Ciencias (RQ1).

Mientras planificamos y enseñamos nuestra lección de ciencias basadas en las artes, te invito a que tomes fotografías de cosas que te parezcan interesantes a lo largo del camino. Podemos comparar notas sobre nuestras experiencias en nuestra próxima entrevista.

RQ1:¿Cuáles son las cualidades de la experiencia de los docentes que utilizan pedagogías basadas en las artes en la clase de Ciencias DLI?
Pregunta 2: ¿Qué recursos lingüísticos, culturales y artísticos emplean los profesores que utilizan métodos pedagógicos basados en las artes en el aula STEM?
RQ3: ¿Cuáles son los enredos humanos y materiales en un aula de Ciencias DLI?

Si en algún momento te sientes incómodo durante la entrevista o con la actividad, puedes retirar tu participación sin penalización. También puedes optar por pensar en una pregunta en particular durante el tiempo que desee o no responderla por cualquier motivo. Estas preguntas son puntos de partida para nuestra conversación sobre usted y su experiencia.

Reglas de juego

No hay respuestas correctas o incorrectas. Me interesa conocer su experiencia utilizando pedagogías basadas en las artes para enseñar ciencias en el aula DLI.

Haré preguntas para impulsar nuestra conversación y usaré imágenes y artefactos de nuestras actividades artísticas en el aula para guiar nuestra conversación. Puede tomarse el tiempo para responder la pregunta o hacer referencia a cualquier otra cosa que la pregunta le indique en su experiencia. Puede responder en inglés o español o alternar entre idiomas.

Terminología
Anécdota: Historia basada en mis observaciones y notas.
Pedagogía basada en las artes: enseñanza utilizando métodos basados en las artes.
Investigación basada en las artes: realizar investigaciones utilizando métodos basados en las artes. Recopilar, organizar o interpretar datos utilizando fotografía, poesía u otro método artístico es una investigación basada en las artes.
Foto-Elicitación: pedirle a alguien que tome y seleccione fotografías y luego le diga lo que significan.
Curar: Seleccionar y montar arte, en sí mismo una forma de arte.

Qué puedes esperar de nuestra próxima entrevista:

Entrevista de obtención de fotografías

Te pediré que selecciones algunas fotos y me las muestres en el orden que elijas. Puedes contarme lo que quieras sobre la foto y lo que significa para ti. Las fotografías están destinadas a servir como recordatorio de la experiencia y ayudarle a procesar cómo fue preparar y enseñar la lección. Te haré preguntas de seguimiento.

Grabaré la entrevista y guardaré las fotos con la entrevista. Esta información se almacenará de forma segura en mi teléfono, que está protegido con contraseña. Descargaré y transcribiré la entrevista con un seudónimo al disco duro de mi computadora y no estará vinculada a su nombre ni a los nombres de sus alumnos.

Tendré algunas anécdotas para compartir contigo al final de nuestra segunda entrevista.

APPENDIX E

PROTOCOL FOR PHOTO ELICITATION INTERVIEW

English Translation

Thank you for taking photos about your experience preparing and teaching an arts-based science lesson.

I am going to ask you to select the photos and show them to me in the order you choose. You can tell me anything you want about the photo and what it means to you. The photos are meant to serve as prompts for your memory of the experience and to help you process what it was like to prepare and teach the lesson. I will ask you follow up questions.

I will record this interview and save the photos with the interview. This information will be safely stored on my phone which is passcode protected. I will download and transcribe the interview with a pseudonym to the hard drive of my computer and will not be linked to your name or the names of your students.

I will have some anecdotes to share with you at the end.

Spanish Translation

Gracias por tomar fotografías sobre su experiencia preparando y enseñando una lección de ciencias usando pedagogías basadas en las artes.

Te voy a pedir que selecciones las fotos y me las muestres en el orden que elijas. Puedes contarme lo que quieras sobre la foto y lo que significa para ti. Las fotografías están destinadas a servir como recordatorio de la experiencia y ayudarte a procesar cómo fue preparar y enseñar la lección. Yo haré preguntas de seguimiento.

Grabaré esta entrevista y guardaré las fotos con la entrevista. Esta información se almacenará de forma segura en mi teléfono, que está protegido con contraseña. Descargaré y transcribiré la entrevista con un seudónimo al disco duro de mi computadora y no estará vinculada a tu nombre ni a los nombres de tus alumnos.

Tendré algunas anécdotas para compartir contigo al final.

APPENDIX F

OBSERVATION GUIDE

"Arts-Based Approaches to STEM Learning in a DLI Setting" 2023
Observation Guide
Researchers: Melisa Cahnmann-Taylor, Elizabeth Dubberly, University of Georgia
Observation Date:
Name of activity:
Grade Level:
Teacher Pseudonym:
Language of Activity:
Standards being addressed by this activity:
School Pseudonym: Otis Elementary School (OES), Charrua School District (CSD)

Pre-observation

1. Sketch classroom layout and the people in the classroom.
2. What is the number of students and adults in the classroom?
3. What are the learning objectives of this lesson?
4. What are the arts-integrated components of this lesson?
5. Describe activity as it is expected to occur.

During activity "look fors"

1. Is the target language used during the activity?
2. Are there any examples of translanguaging?
3. What evidence is there that the two content areas (arts and STEM) being addressed?
4. What is the evidence of student engagement?
5. What is the evidence of teacher engagement?
6. How are students interacting with each other?
7. How are students interacting with the teacher?

Post observation

1. Describe activity as it occurred.
2. Were students able to complete "exit ticket" work?
3. Was there enough time to complete the lesson?
4. Did the students have the knowledge to answer questions about the tasks on their own?
5. Describe the physical environment at the end of the lesson. (messy, tidy, were things moved, have supplies been left on the floor or on desks?)

6. Describe the classroom affective environment at the end of the lesson (noisy, quiet, relaxed, anxious, happy, sad, etc.).

APPENDIX G

PROTOCOL FOR INTERVIEW 3

English Translation

Introduction
Hello. Thank you for participating in the interview today. Thank you for signing the consent form and agreeing to be a part of this study.

Purpose
The purpose of this study is to explore your experiences of being a DLI teacher using arts based pedagogies in Science class (RQ1).

The study is guided by these research questions:

RQ1:What are the qualities of the experience of teachers who use arts-based pedagogies in DLI Science class?
RQ2: What linguistic, cultural and artistic resources are employed by teachers that use arts based methods in the STEM classroom?
RQ3: What are the human and material entanglements in a DLI Science classroom ?

If you feel uncomfortable at any time in the interview, you are welcome to withdraw your participation with no penalty. You can also choose to think about a particular question for as long or as little as you wish or not answer it for any reason.

Ground Rules
There are no right or wrong answers. I am interested in learning about your experience using arts-based pedagogies to teach Science in the DLI classroom.

Interview 3
Our meeting today has three goals:

1. Today we will be looking over the transcripts of our first two interviews. Please feel free to make any notes of things you would like for us to discuss or anything you would like to change. I would like for you to feel that these transcripts are accurate representations of our conversation and what you wanted to say about the experience of being a DLI teacher.
2. Some poems resonated with me after our interviews based on some themes we discussed. I made notes on them using our transcripts. I find these poems powerful and your interview illuminates them further for me.

3. Using the transcripts, I invite you to try a poem activity. There are several prompts that you can choose from or you can suggest something yourself.

You can answer in English or Spanish or switch back and forth between languages.

Terminology
Arts-Based Pedagogy: Teaching using arts-based methods.
Arts-Based Research: Doing research using arts based methods. Gathering, organizing or interpreting data using photography, poetry or another arts method is arts-based research.
Poetic Inquiry: Research that uses poetry as a methodology for gathering or interpreting data.
Poetry Prompt: A suggestion for how to begin a poem: this can be a structure, an idea or an image.

Spanish Translation

Introducción
Hola. Gracias por participar en la entrevista de hoy. Gracias por firmar el formulario de consentimiento y aceptar ser parte de este estudio.

Objetivo
El propósito de este estudio es explorar sus experiencias como profesor de DLI utilizando pedagogías basadas en las artes en la clase de ciencias (RQ1).

RQ1:¿Cuáles son las cualidades de la experiencia de los docentes que utilizan pedagogías artísticas en la clase de Ciencias DLI?
Pregunta 2: ¿Qué recursos lingüísticos, culturales y artísticos emplean las maestras que utilizan métodos basados en las artes en la clase de ciencias?
RQ3: ¿Cuáles son los enredos humanos y materiales en un aula de Ciencias DLI que también es un sitio de investigación?

Si en algún momento de la entrevista se siente incómodo, puede retirar su participación sin pena. También puede optar por pensar en una pregunta en particular durante el tiempo que desee o no responder por cualquier motivo.

Normas
No hay respuestas correctas o incorrectas. Me interesa conocer tu experiencia utilizando pedagogías basadas en las artes para enseñar ciencias en el aula DLI.

Nuestra reunión de hoy tiene tres objetivos:
1. Hoy revisaremos las transcripciones de nuestras dos primeras entrevistas. Siéntase libre de tomar notas sobre las cosas que le gustaría que discutamos o cualquier cosa que le gustaría cambiar. Me gustaría que sintiera que estas transcripciones son representaciones precisas de nuestra conversación y de lo que quería decir sobre la experiencia de ser maestro de DLI.

2. Algunos poemas resonaron en mí después de nuestras entrevistas basadas en algunos temas que discutimos. Tomé notas sobre ellos usando nuestras transcripciones. Estos poemas me parecen poderosos y tu entrevista me los ilumina aún más.
3. Usando las transcripciones, te invito a probar una actividad de poema. Hay varias indicaciones entre las que puede elegir o puede sugerir algo usted mismo.

Puede responder en inglés o español o alternar entre idiomas.

Terminología
Pedagogía basada en las artes: enseñanza utilizando métodos basados en las artes.
Investigación basada en las artes: realizar investigaciones utilizando métodos basados en las artes. Recopilar, organizar o interpretar datos utilizando fotografía, poesía u otro método artístico es una investigación basada en las artes.
Investigación poética: Investigación que utiliza la poesía como metodología para recopilar o interpretar datos.
Mensaje de poesía: una sugerencia sobre cómo comenzar un poema: puede ser una estructura, una idea o una imagen.

APPENDIX H

POEM PROMPTS

Found Poem Prompt: Collage/Poema Encontrado: Collage

"What is it like to be a DLI Science teacher?"
"¿Cómo es ser maestra de ciencias DLI?"

For this activity, we are going to look for words in the transcripts that we can use to create a found poem.

Cut and paste the transcripts to communicate "What is the experience of teaching Science in Spanish in a DLI program?" "What is it like to be a DLI teacher?"

Add any drawings, doodles or cut out pictures that lend significance to your poem.

Para esta actividad, vamos a buscar palabras en las transcripciones que usaremos para crear un poema encontrado.

Recorta y pega palabras o frases de la transcripción que comunique "¿Cuál es la experiencia de enseñar ciencias en español en un programa de doble inmersión?" o "¿Cómo se siente ser una maestra de DLI?

Agrega cualquier dibujo, garabato o recorte de imagen que añade significado al poema.

Found Poem Prompt: Diamante/Poema Encontrado: Diamante

"What is the experience of being a DLI Science teacher?"
"What is it like to be a DLI Spanish teacher?"
"¿Cómo es ser maestra de ciencias DLI?"
"¿Cómo es ser maestra de español en un programa de DLI?"

For this activity, we are going to look for words in the transcripts that we can use to create a found poem. For the Diamante Found Poem, we will follow the following structure:

Para esta actividad, buscaremos palabras en las transcripciones que podamos usar para crear un poema encontrado. Para el poema Diamante, usaremos la siguiente estructura.

Línea 1: Uno sustantivo/One noun
Línea 2: Dos adjetivos que describen el sustantivo en la línea 1/Two adjectives that describe the noun in line 1

Línea 3: Tres verbos de acción que terminan en "- ando" que refieren al sustantivo en la línea 1/ Three action verbs ending in "-ing" that refer to the noun in line 1
Línea 4: Cuatro sustantivos (los primeros dos se relacionan con el sustantivo en la línea 1, los segundos 1 se relacionan con el sustantivo en la línea 7)/ Four nouns (the first two related to the noun in line 1 and the second two related to the noun in line 7)
Línea 5: Tres verbos de acción que terminan en "- ando" que refieren al sustantivo en la línea 7/Three action verbs ending in "-ing" that refer to the noun in line 7
Línea 6: Dos adjetivos que describen el sustantivo en la línea 7/Two adjectives that describe the noun in line 7
Línea 7: Uno sustantivo que es el opuesto al sustantivo en línea 1 o que juega con el significado del sustantivo en línea 1/One noun that is the opposite of line 1 or plays with with significance of noun in line 1

Found Poem Prompt: Acrostic/Poema Encontrado: Acróstico

"What is the experience of being a DLI Science teacher?"
"What is it like to be a DLI Spanish teacher?"
"¿Cómo es ser maestra de ciencias DLI?"
"¿Cómo es ser maestra de español en un programa de DLI?"

Write a word vertically along the left side of the paper. Choose a word that is meaningful to you about the experience of being a DLI teacher teaching science.The word can be in English or Spanish. Look for words in the transcript that begin with each letter of the word and write them horizontally across the page. After you have found a word from the transcript that matches each letter from your initial word, think of a title.

Escriba una palabra verticalmente en el lado izquierdo del papel. Elige una palabra que sea significativa para usted sobre la experiencia de ser profesor de DLI enseñando ciencias. La palabra puede estar en inglés o español. Busque palabras en la transcripción que comiencen con cada letra de la palabra y escríbalas horizontalmente a lo largo de la página. Una vez que haya encontrado una palabra de la transcripción que coincida con cada letra de su palabra inicial, piense en un título.

Poem Prompt: Renga
"What is the experience of being a DLI Science teacher?"
"What is it like to be a DLI teacher?"
"¿Cómo es ser maestra de ciencias DLI?"
"¿Cómo es ser maestra de español en un programa de DLI?"

The renga is an ancient Japanese collaborative poem form with the goal of having two stanzas in five lines. The first stanza has three lines, with a 5-7-5 syllable count. This is the stanza that presents the image or theme of the poem. The second stanza is written by another poet who responds to the first stanza with two 7-syllable lines. These verses are linked through a common theme and are meant to show a connection between the poets.

Person 1 will write a presenting stanza using a 5-7-5 syllable count format in three lines. Person 2 will respond with a stanza in two 7-syllable lines.

As you consider themes from our conversations and transcripts, choose an image to evoke in a presenting stanza of 5-7-5.

La renga es un género antiguo de poema colaborativo japonés que tiene como objetivo de componer 2 estrofas en 5 líneas. La primera estrofa tiene tres versos, con un conteo de 5-7-5 sílabas. Esta es la estrofa que presenta la imagen o tema del poema. La segunda estrofa está escrita por otro poeta que responde a la primera estrofa con dos versos de 7 sílabas. Estos versos están vinculados a través de un tema común y pretenden mostrar una conexión entre los poetas.

La persona 1 escribirá una estrofa de presentación utilizando un formato de conteo de 5-7-5 sílabas en tres líneas. La persona 2 responderá con una estrofa de dos líneas de 7 sílabas.

Mientras consideras temas de nuestras conversaciones y transcripciones, elige una imagen para evocar en una estrofa de presentación de 5-7-5.

APPENDIX I

PROTOCOL FOR INTERVIEW 4

Purpose

The purpose of this study is to explore your experiences of being a DLI teacher using arts based pedagogies in Science class (RQ1). This final interview is 10 questions that follow up with our classroom experiences and previous interviews.

RQ1:What are the qualities of the experience of teachers who use arts-based pedagogies in DLI Science class?
RQ2: What linguistic, cultural and artistic resources are employed by teachers that use arts based methods in the STEM classroom?
RQ3: What are the human and material entanglements in a DLI Science classroom ?

If you feel uncomfortable at any time in the interview, you are welcome to withdraw your participation with no penalty. You can also choose to think about a particular question for as long or as little as you wish or not answer it for any reason. These questions are starting points for our conversation about you and your experience.

Objetivo

El propósito de este estudio es explorar sus experiencias como profesor de DLI utilizando pedagogías basadas en las artes en la clase de Ciencias (RQ1). Esta entrevista final consta de 10 preguntas que siguen nuestras experiencias en el aula y entrevistas anteriores.

RQ1:¿Cuáles son las cualidades de la experiencia de los docentes que usan pedagogías basadas en las artes en la clase de Ciencias DLI?
Pregunta 2: ¿Qué recursos lingüísticos, culturales y artísticos emplean los profesores que utilizan métodos pedagógicos basados en las artes en el aula STEM?
RQ3: ¿Cuáles son los enredos humanos y materiales en un aula de Ciencias DLI?

Si en algún momento de la entrevista te sientes incómoda, puedes retirar tu participación sin penalización. También puedes optar por pensar en una pregunta en particular durante el tiempo que desees o no responder por cualquier motivo. Estas preguntas son puntos de partida para nuestra conversación acerca de ti y tu experiencia.

Ground Rules

There are no right or wrong answers. I am interested in learning about your experience using arts-based pedagogies to teach Science in the DLI classroom.

You can answer these questions orally to me, or in writing on paper or digitally. Feel free to take time to answer the question or refer to anything else that the question prompts in your experience. You can answer in English or Spanish or switch back and forth between languages.

Reglas de juego

No hay respuestas correctas o incorrectas. Me interesa conocer más acerca de tu experiencia utilizando pedagogías basadas en las artes para enseñar ciencias en el aula DLI.

Puedes responderme estas preguntas de forma oral, por escrito en papel o digitalmente. No dudes en tomar el tiempo que desees para responder la pregunta o hacer referencia a cualquier otra cosa que la pregunta genere de tu experiencia. Puedes responder en inglés o español o alternar entre idiomas.

1. ¿Cómo fue para ti usar dramatización en la clase de ciencias? What was it like for you to use drama in science class?
2. Cuando usamos dramatización, ¿te parece que participaron más niños? When we used drama, do you think that more students participated?
3. ¿Qué te parece que hayan participado más personas en el discurso de la clase? What do you think about more people participating in class discourse?
4. Cuando hay más personas que cuentan o interpretan su experiencia, ¿qué significa eso para ti como maestra? When more people tell about or interpret their experience, what does that mean for you as a teacher?
5. ¿Cómo cambia la relación en la clase cuando más personas intervienen? How do relationships in the class change when more people participate in class?
6. ¿Cómo cambia la relación entre el maestro y los estudiantes o entre ellos cuando se incorpora el teatro en la clase de ciencias? How do things change between the teacher and student or between students when drama is incorporated in science class?
7. ¿Cómo es tu experiencia de la clase luego de que ellos hayan intervenido en una experiencia que incorpora el teatro en las ciencias ? What is your experience of the class after they have participated in a theatre experience in science class?
8. ¿Cambió algo en tu relación con los niños o en la relación de ellos hacia ti luego de una experiencia de teatro en la clase de ciencias? Did anything change in your relationship with the students or their relationship to you after a theatre experience?
9. ¿Cambió algo en la actitud de los chicos con la clase luego de una experiencia de teatro en la clase de ciencias? Did anything change in the kids' attitude toward the class after participating in theatre activities in science class?
10. ¿Cambió algo en tu postura ante la clase de ciencias? ¿Que? ¿Por qué? Did anything change regarding your positioning about science class? What ?Why?