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A Conspiracy to Resurrect Life and Social Justice in Science Curriculum with Henrietta Lacks: A Play

Dana Compton McCullough

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by

DANA COMPTON MCCULLOUGH

(Under the direction of John Weaver)

ABSTRACT

This dissertation is a theoretical inquiry into alternative pedagogies that challenge current standardized practices in the field of science education. Building upon a wide array of work, such as philosophy and history of science (Haraway, 1989, 1991,1997, 2000, 2007; Harding 1991, 1998; Latour, 1987, 1991/1993, 1991; Rheinberger, 1992, 2010; Serres, 1982/2007,1991/1997, 2010/2012), curriculum studies and science curriculum (Appelbaum, 2001, 2010; Barone, 1990, 2000; Blades, 1997, 2001; Calabrese-Barton, 2003, 2011; Cartwright, 1999; Doll, 1993; Grumet, 1999; He, 2003,2008, 2009,2013; Lather, 1997,2007,2010; Schubert, 1986, 2009; Schwab, 1978; Weaver, 2001, 2004, 2010, 2015); and playwriting (Brody, 2011; Innes, 2002; and Mighton, 1987, 1988), I explore how the stories of Henrietta Lacks become part of a conspiracy to change science education. Conversations directly involving Henrietta Lacks were inspired by the writings of Hannah Landecker (1999, 2000, 2007), Rebecca Skloot (2010), and Priscilla Wald (2012a, 2012b).

I create imaginary dialogues which serve as the theoretical framework for each chapter. Each chapter unfolds in a form of a play with imaginary settings and events that bring Henrietta Lacks back from the grave to participate in conversations about science, society and social justice. I interweave my personal experience and the experiences of my students with the stories

of Henrietta Lacks and her famous HeLa cells. The conversations are based on the researcher's experiences in graduate courses, direct quotations from philosophers of science, historians of science, science educators, and curriculum theorists, and use of the story of Henrietta Lacks in a high school biology classroom. Commentary follows each Act in the play. The play describes the journey of a graduate student/high school teacher as she researches the importance of the philosophy of science, history of science, science curriculum and social justice in science education. Through reflections on the created conversations, the role of the story of Henrietta Lacks is examined and described in multiple settings, beginning in an imaginary academic meeting and ending with student conversations in a classroom. Each setting provides a space for conversation participants to explore their personal connections with science, science curriculum, issues of social justice related to science, and Henrietta Lacks. Through my dissertation inquiry, I call for a multidimensional science curriculum that contests a linear standardized science curriculum, builds upon philosophy of science and history of science, and acts upon social justice through the telling and sharing of the story of Henrietta Lacks.

INDEX WORDS: Henrietta Lacks, play, science education, curriculum studies, science curriculum, social justice

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A PLAY

by

DANA COMPTON MCCULLOUGH

B.S. Augusta College, 1987

M.S. Georgia Southern University, 1993

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DANA COMPTON MCCULLOUGH

Major Professor: John A. Weaver

Committee: Ming Fang He

James C. Jupp

David Blades

Electronic Version Approved:

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DEDICATION

I

"Each of us is solitary: each of us dies alone: alright, that's a fate against which we can't struggle—but there is plenty in our condition which is not fate, and against which we are less than human unless we do struggle" (Snow, 1959/2013, p. 7).

I dedicate this dissertation to all those who struggle to create a better world.

II

To Robert, Anthony, Matthew,

Mama, Daddy

Dory,

Cooper, Jessie, Violet,

And the Great Blue Heron that resides on the Little River

I appreciate your overwhelming love and support in this journey. I hope in some way that this work will make a difference in the world, just as your love and support

have made a difference in my struggle and in my world.

III

Thanks to those who brought sunshine, rainbows, unicorns, and deviled eggs to this journey

Ms. Newton, Ms. Sonnenschein, Dr. Farrell, and Ms. Hager

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PROLOGUE

Invitation to a Conspiracy

A Conspiracy to Resurrect Life in Science Class with Henrietta Lacks is a dissertation inquiry that seeks to bring about change in science education—more specifically, science education in a high school science classroom. What kind of change? Change in a standardized curriculum in which high-stakes testing has overtaken teaching and learning for all participants in education in my school district located in the southeastern United States. Why the word conspiracy? Barone (1990) defines conspiracy not in an "obvious and shallow political sense" or with "connotations of evil or treachery as inherent in an act of conspiracy" but as a "profoundly ethical and moral undertaking" (p. 313). The desire for making change is the foundation for this inquiry. Barone (1990) notes that a conspiracy is "a conversation about the relationship between present and future worlds" (p. 313). The reader, "a historically situated self, learns from the recreated other in the text to see features of a social reality that may have gone previously unnoticed" (p. 314). In this dissertation inquiry, groups of scholars, teachers, and students meet and converse in imaginary settings. All boundaries of time become blurred. Spaces between old and new worlds are forged. I invite you to join me in this conspiracy.

I hope you will find the narrative inspiring and simple to follow. I hope to present a storied work—a storied work that can be used to build bridges connecting the lives of teachers and students to science and a woman named Henrietta Lacks. Why this woman you may ask? Henrietta Lacks died on October 4, 1951. Cells taken from her without permission became the first human cells to be grown outside the body. Her cells were called HeLa. This name is composed of the first two letters of her first name and the first two letters of her last name. He for Henrietta and La for Lacks. This cell line is still in existence today. Henrietta died, but her

amazing cells live in laboratories all over the world today—63 years later. Henrietta's cells have been to outer space. Henrietta's cells have been used to test and develop: the polio vaccine, chemotherapy, cloning, gene mapping, and in vitro fertilization. Her cells have become very important in testing drugs to treat herpes, leukemia, influenza, hemophilia, and Parkinson's disease. Henrietta Lacks was known only as HeLa, the name given to her famous and infamous cells, for more than 25 years following her death. No one, except the scientists who took her cells, knew the origin of the cells. Parts of Henrietta's story will be shared throughout the dissertation. Her connection to science, science education, and participants of science and education will be explained in detail in the following chapters.

A Bridge, A Place to Linger

These bridges that I speak about occur through the telling of stories, and the witnessing of conversations. I use the word bridge to designate a space where a third thing is created between the participants themselves and the curriculum. I am not speaking of a simple bridge serving a purpose of transportation. Aoki (1996) writes about a type of bridge in which "we are in no hurry to cross over; in fact such bridges urge us to linger" (p. 5). Stories require a "teller's thoughtfulness, canniness, sensitivity and talent" (Coles, 1997, p. 93). When a story is woven successfully, the product that emerges is a kind of truth:

> An enveloping and unforgettable wisdom that strikes the reader as realer than the truth, a truth that penetrates deep within one, that leaps beyond verisimilitude or incisive portrayal, appealing and recognizable characterization, and lands on a terrain where the cognitive, the emotional, the reflective, and the moral live side-by-side. (Coles, 1997, p. 93)

When stories are part of research one must kept the following in mind: "One can get some 'news,' make some 'observations,' obtain some 'data,' conduct some interviews…wrap up one's project and leave" on time and on budget or "one can linger and try to learn something other than the answer to one's original inquiry" (Coles, 1997, p. 75).

The word linger strikes me as the secret to getting at the heart of the matter. Come and linger a while. "We bring all our sorted histories, hopes, and desires to the project of curriculum theory, hooking onto familiar stories and creating new ones" (Baszile, 2010, p. 483). One might say stories^3 (stories cubed): Their story, your story, and my story— all-intersecting, each of us carrying our own subjectivities and personal histories, each of us being an "other." Coles (1989) says, "It's what we all carry with us on this trip we take, and we owe it to each other to respect our stories and learn from these stories" (p. 30). Our personal stories are part of us. These stories help us make connections as we journey through life. As we travel, we add to our story, making meaning by connecting our stories to new knowledge we acquire as we live our lives. As my students are introduced to the story of Henrietta Lacks, they may write and rewrite parts of their own story.

For the reader and writer, this must be a "cautious and wary" endeavor (Barone, 1990, p. 314). This act "ultimately resonates with the interior vision of the text and is persuaded of its usefulness," and can be "borrowed for his own" (p. 314). The text of this dissertation will be woven together in order to create a space for different perspectives concerning science, science education, and possible changes within all that encompasses education to be considered— changes on multiple levels of education involving a graduate student, high school students, teachers, and society as a whole. I use the word conspiracy to address that this journey will be composed of several groups of individuals all working for the same goal. Each group of

individuals brings a different perspective. Barone (1990) says, "There is breathing together, a sharing of ideas and ideals for the purposes of an improved reality. This conspiracy is a plot against inadequate present conditions in favor of an emancipatory social arrangement in the future" (p. 314).

In schools, I envision an improved reality as one that focuses more on individuals, students, teachers, and scholars and less on methods, standardized testing, and marginalization due to test scores. As a teacher, I must find a platform that will provide the space "from which we launch educational projects that aim to change what is into what ought to be" (p. 314). I invite you to join Henrietta Lacks and me in this conspiracy and become part of the resurrection so desperately needed in education. Be forewarned, a conspiracy is not an easy journey. If you decide to come along I warn you to be prepared. This text will be full of physical disruptions…one minute you might be reading narrative…the next you will be reading a play. The disruptions are intentional—intentional for the sake of introducing noise into the curriculum. This "noise" is introduced and situated between two loci disturbing each opposing end (Serres, 1982, 2007, p. 14). This in-between third place is a "space of transformation" (Serres, 1982, 2007, p. 73; Rutherford, 1990; Aoki, 1996). It is in the learning that all things can possibly become new. It will be in this space that we can understand how the history, culture, philosophy of science, science education, and social justice intersect with Henrietta Lacks and participants of science education. Transformation cannot take place without venturing outside boundaries and crossing predetermined borders. A scientific system inside the black box, left for only scientists, must be opened and made available to the world. The world can gain understanding and social justice by constructing connections to the contents in "spaces of transformation" (Serres, 1982, 2007, p. 73).

Resurrection: Reason for a Conspiracy

The term resurrect in the title was selected from a multitude of words that all mean change: reconceptualize, restructure, rebuild, revive, renew. Resurrect is most commonly used to describe bringing back to life, or to rise from the dead. This can mean physical resurrection or the resurrection of ideas. There are multiple examples of resurrection in the work that will follow. Rebecca Skloot (2010) resurrects Henrietta's story from the grave with her book, *The Immortal Life of Henrietta Lacks*. Why did Skloot resurrect this story? As I said before, doctors took a sample of Henrietta's cells without her permission. Doctors at Johns Hopkins University in Baltimore, Maryland, conveniently failed to tell others that the cells came from Henrietta Lacks. The cells were only known by their code name HeLa (He for Henrietta and La for Lacks) for more than 25 years following Henrietta's death. Skloot as a biology student was amazed and appalled that no one knew the name Henrietta Lacks. Skloot wrote her book to explain the details of how the Lacks family comes to know that Henrietta's cells. Without Henrietta's cells, many advances in science would be non-existent. In the following pages, Henrietta Lacks herself is resurrected from the grave so she can take part in discussions concerning the intersections of science, philosophy, history, culture, and education. Henrietta's cells have been part of science since 1951: Can Henrietta herself, and her story, also become part of science education?

Henrietta and her story can serve as symbols of the resurrection that needs to happen in present-day schools. Why is there a need for resurrection in schools? Standardized testing has caused many students and teachers to become disillusioned with what goes on in classrooms each day[1]. For example, in my district, classroom instruction is predetermined by a list of standards, posted on the concrete-block wall of my classroom. Not only are the standards

[1] See Brian Heese (2015) for a complete literature review involving the impact of standardized education on teachers, students, and curriculum.

predetermined, the method in which instructional delivery takes place is highly monitored and scripted, according to the Teacher Keys Effectiveness System—the current evaluation system in place in the state of Georgia. Not only do students participate in standardized instruction, they are also required to take a standardized end of course (EOCT) assessment and student learning objective tests (SLO) for each course for measuring teacher performance. End of course assessments are created by the state. SLO assessments are created at the district level. Why all these tests?

Teachers in Georgia are constantly fed information from our state Department of Education. Here is a sample of the type of information relayed to teachers. Please note in the third paragraph that there are no citations to support what is being said. The information simply says "research indicates that educators who set high quality objectives realize greater improvement in student performance" (Georgia Department of Education, 2014).

> Student learning is the ultimate measure of the success of a teacher and an instructional leader. One component of the Teacher Keys Effectiveness System is Student Growth. For teachers of tested subjects, this component consists of a student growth percentile measure. Tested subjects include reading, English language arts, mathematics, science, and social studies for grades 4-8 and all high school courses for which there is an End of Course Test (EOCT). There are further mandated testing requirements:
>
> Non-tested subjects include all courses not listed as tested subjects. Approximately 70-75% of all teachers teach non-tested subjects for at least some portion of the instructional day. For teachers of non-tested subjects, this component consists of the Georgia

Department of Education (DOE) approved Student Learning Objectives (SLO) utilizing local education agency (LEA) identified growth measures.

The professional practice of utilizing SLO's to measure student growth is the cornerstone of the Department of Education's emphasis on using assessment results to guide instruction. Research indicates that educators who set high quality objectives realize greater improvement in student performance. Establishing this systematic approach requires unprecedented collaboration among state leaders, LEA leaders, and local school staffs. Curriculum, assessment, and technology leaders in the LEA and classrooms collaborate to create SLO's for appropriate courses. Each LEA SLO is submitted to the DOE for audit review and approval (Georgia Department of Education, 2014).

Imagine the amount of testing involved in such a system. Most students are enrolled in seven courses. For each course students take an EOCT or SLO test along with one benchmark per course per nine-week grading period. Benchmark dates are predetermined and fall near the end of each nine weeks grading period. Benchmarks are scheduled based on the curriculum map. These computer-generated tests are composed of 25 or more questions and must be given in the same manner as a standardized test. The length of the test requires the use of an entire class period. Four benchmarks results in the loss of four days of instruction.

That adds up to over 10 mandated assessments per course, depending on the mix of EOCT's and SLO's distributed throughout the student's 7 period day. This simply means that students my possibly have up to 70 assessment periods in one academic year of school. Most assessment periods involve at least one class period. Assessment results are available for benchmarks and should be revisited with the students: That calculates to another 28 hours just

spent on EOCT and SLO testing alone. This calculation does not include teacher-given assessments for the student's coursework.

Before long, students and teachers are oblivious to the amount of time spent on testing, and meaningful activities such as science labs fall by the wayside. Students are arriving in science classrooms "having had little or no first hand experiences with science" (Berry B. , 2007, p. 5). In elementary school and middle school "they have read about animals and plants, but the scripted curriculum…does not allow time for hands-on experiments" (p. 5). Testing and practice for testing monopolize all classroom activities. Berry (2007) reports the following:

> Students do not know how to pose a question, make a hypothesis, or conduct an experiment. What is worse is that they are not excited about science — they have missed out on the idea that they themselves can actually investigate the world around them and make discoveries for themselves, instead of only reading about the discoveries of others. (p. 5)

Instead science students must focus on memorization and becoming accomplished multiple-choice test takers.

Current practices in all subject areas and all grade levels continue to be exemplified by what Freire described as an educational banking system. Freire (1970) tells us "the student records, memorizes, and repeats these phrases without perceiving" what the information actually means (p. 71). Instead of education being an active, enriching, student-centered process, "education thus becomes an act of depositing, in which the students are the depositories, and the teacher is the depositor. Instead of communicating, the teacher issues communiques and makes deposits which the students patiently receive, memorize and repeat" (p. 72). The only opportunity available for students in this situation is for them "to become collectors or

cataloguers of things they store" (p. 72). Unfortunately, in this scenario, "it is the people themselves who are filed away through the lack of creativity, transformation, and knowledge in this (at best) misguided system" (p. 72). Freire (1970) stresses that "apart from inquiry, apart from the praxis, individuals cannot be truly human" (p. 72). Knowledge is not going to emerge from a system with so many restraints. "Knowledge emerges only through invention and re-invention, through the restless, impatient continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (p. 72).

Ask the over 100 teachers in the building that I teach in and they will agree that high stakes testing is all about memorizing information for the test. Brian Heese (2015) provides a detailed account of 24 separate research inquiries that looked at the impact of high stakes testing on curriculum and instruction as related to teacher centered instruction and rote memorization alone. Heese (2015) provides other evidence to tell us what we as educators in a high-stakes testing environment already know: High stakes testing increases teacher stress and anxiety, decreases teacher morale, impacts teacher relationships with other teachers and with students, increases amount of work required in the school day, and diverts funding away from instructional materials and to materials needed for testing and testing preparation. High stakes testing impacts the number of classroom assessments and the formats of how exams are written as well as how exams are weighted in a student's overall grade. In my building, I would say the biggest complaint about high stakes testing is the amount of time it takes from classroom instruction and activities. Heese (2015) summarizes 27 research articles that deal with loss of instructional time. The evidence is overwhelming that high-stakes testing is not good for education. A one-size-fits-all system cannot meet the needs of our diverse populations in schools. It is no wonder that Madeline Grumet (1999) describes "standardized education as being

very short of the rich and abundant experience that education can bring" (p. 24). Curriculum theorist, William Pinar, calls this a nightmare:

> The nightmare that is the present—in which educators have little control over the curriculum, the very organizational and intellectual center of schooling—has several markers, prominent among them 'accountability,' an apparently commonsensical idea that makes teachers, rather than students and their parents, responsible for students' educational accomplishment. (Pinar, 2004, p. 5)

Educators are in dire need of alternative approaches and pedagogy that will resurrect an enthusiasm for learning, and bring life and love for learning back to classrooms. Can Curriculum Studies offers hope for educational changes? Can Curriculum Studies inform change in the curriculum presented in this teacher's high school classroom? Current conversations in education are being monopolized by standardized tests and standardized curriculum. A recommitment to conversation involving curriculum theory and educational practices needs to take place.

Can including Henrietta Lacks and her story in the classroom breathe life and social justice back into a standardized curriculum, tested-to-death students, and weary teachers? Henrietta has a history of being heard from the grave. These stories are scattered through the text of Rebecca Skloot's book, *The Immortal Life of Henrietta Lacks*. As two cousins lowered her coffin into her grave and began covering Henrietta with dirt,

> The sky turned black as strap molasses. The rain fell thick and fast. Then came long rumbling thunder, screams from the babies, and a blast of wind so strong it tore the metal roof off the barn below the cemetery and sent it flying through the air…the wind caused

> fires that burned tobacco fields. It ripped trees from the ground, blew power lines out for miles, and tore one Lacks cousin's wooden cabin clear out of the ground, threw him from the living room into his garden, then landed on top of him, killing him instantly. Years later, when Henrietta's cousin Peter looked back on that day, he just shook his baldhead and laughed: Hennie never was what you'd call a beatin-around-the-bush woman…We shoulda known she was tryin to tell us somethin with the storm. (Skloot, 2010, p. 92)

What can a reading of Henrietta's story tell us about science and science education? Will curriculum writers of science allow a story such as Henrietta's to enter their conversations and become a component of contemporary conversations about science and science education? Are stories such as Henrietta's deleted in the processes of standardizing science and science education? A science that is all-inclusive or posthuman[2] cannot ignore the voice of Henrietta Lacks or the voices and cries of countless others. "If the cultural studies of science seek to become a viable alternative to traditional enlightened science, it will have to begin to invent a pedagogy that offers alternative ways of seeing nature, science and the world" (Weaver, 2001, p. 18). By viewing science through the eyes of Henrietta Lacks, new pedagogy can evolve. The new curriculum should allow students to create space to explore connections between the curriculum and science, the curriculum and society, and the curriculum and the student.

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[2] The posthuman condition "implies the merging of humans and machines in order to enhance or improve human capabilities" (Weaver, 2010, p. 11). The life of Henrietta's cells has been enhanced by technologies in the field of biotechnology. With these technologies, her cells have become immortal. Posthumanism also calls for "forms of democratic education, curriculum and pedagogy that deconstruct the common sense, taken-for-granted naturalness of humanism, not from an anti-humanist perspective, but as a movement beyond the limits and contradictions of the humanist project while still maintaining the modernist and humanists projects of rights, justice, equity, and freedom" (Snaza & Weaver, 2015, p. x).

Setting the Stage for a Conspiracy

This dissertation inquiry is presented in a book format. It consists of a prologue, eight chapters, and an afterward. Parts of the book are written as narrative, others as a play, and some in the form of poetry. These various formats not only represent a creative approach to dissertation writing, they demonstrate ways that science can be presented, understood, and created in an aesthetic format. This work is polytheoretical. I draw upon the theoretical traditions of Philosophy of Science, History of Science, Cultural Studies of Science, Science Education, Curriculum Studies and works of literature written by Emily Dickenson, Herman Melville, Alexander Von Humboldt, Ralph Waldo Emerson, and science journalist Rebecca Skloot.

There are several stories woven together in this work. The scripted dialogue shows an evolution of my thinking regarding Henrietta Lacks, science, science education, and social justice. There are several storylines that flow through the dissertation. There are multiple stories within the story. As a graduate student and high school teacher, I become part of these conversations. As the following theatrical, somewhat fictional, somewhat nonfictional scenes unfold, I have created two composited characters, Mrs. Margaret Hoffen and Mrs. Delores Pequod. Mrs. Margaret Hoffen is a fictitious teacher, a composite character, who has hope that by using alternative pedagogies in her classroom she can indeed resurrect life in her classroom. I searched for a word meaning hope that could double as a surname. I found the German word *hoffen*. In order for a conspiracy in education to occur we must have hope. Emily Dickenson penned a poem about hope, comparing hope to a bird:

Hope

Hope is the thing with feathers

That perches in the soul,

And sings the tune—without the words,

And never stops at all,

And sweetest in the gale is heard;

And sore must be the storm

That could abash the little bird

That kept so many warm.

I've heard it in the chilliest land,

And on the strangest sea;

Yet, never, in extremity,

It asked a crumb of me. (Dickenson, 1993, p. 24)

The hope that Mrs. Hoffen wants to bring to education is very similar to Dickenson's bird metaphor. Mrs. Hoffen has hope for education that "perches in [her] soul." She finds this hope at a time when a raging storm of controversy is present in education. One might call this the standardization storm—standardized curriculum, standardized testing and standardized teaching. Rubin & Kazanjian (2011) tell us that

> Standardization and curriculum alignment are the dominant forces in education today. Due in part to the No Child Left Behind Act (NCLB) of 2001, education has become singularly focused on teaching towards the test in order to meet Adequate Yearly Progress (AYP), yet data has shown that using standardized testing does not result in increased student learning or development. (p. 94)

This raging storm involves the detrimental effects that standardization and strict curriculum alignment have, not only on students but on educators as well. Giroux (2009) cried out to our current administration to inform them that they must understand that "the crisis in education in not only an economic problem that requires funds to rebuild old and new schools but also a political and ethical crisis about the very nature of citizenship and democracy" (p. 262). There is "more at risk here than unhappy teachers and over-programed children. There is a battle looming on the horizon as to what type of society we want to live in and what type of citizens will comprise that society" (Rubin & Kazanjian, 2011, p. 103).

Margaret Hoffen wants her students to understand their role in a democratic society. She wants them to find meaning in the curriculum that she teaches. She wants them to understand that it is through learning that we can facilitate change in society. She has hope for students and fellow teachers that the standardized curriculum can become infiltrated with meaning that will translate into meaning relevant to life and living. Can her hope provide warmth, even in the "chilliest of lands" of standardization and controversy (Dickenson, 1993, p. 24)?

Herman Melville named the ship in *Moby Dick* the *Pequod*, a ship "named for the once-defeated Indian tribe…is the mythic incarnation of America: a country blessed by God and by free enterprise that nonetheless embraces the barbarity it supposedly supplanted" (Philbrick,

2011, p. 27). The *Pequod's* captain, Ahab, "has no qualms about exploiting the whale man under his employ" (p. 29). Mrs. Delores Pequod has similar characteristics. There is foreshadowing throughout Melville's story that warns us of the gloom and doom to come. Mrs. Delores Pequod, again a composite character, represents the negative aspects of teaching and education. This character resists the change in education. She tries to cast a dark cloud on all who work toward change. Her first name means sorrow. It is such attitudes that might thwart the hope of resurrecting life in science classrooms.

This work is informed by work from several fields of study. The work has evolved into a web of sorts even though, as you read the story of my journey with Henrietta Lacks, you will see a more storied chronological work of sorts. The following fields of study: Philosophy of science, History of Science, Cultural Studies of Science, Science Education, Science Theater. Works of playwrights, explorers, transcendentalists, and high school students come together.

The goal of the conversations in the fictitious settings, taking place without the boundaries of time, will seek to challenge the traditions of science and science education. Henrietta Lacks is a character in the play. She will be the main character and topic of the conversations in the upcoming chapters and scenes. Henrietta is resurrected to challenge scientists and science educators to push existing boundaries in order to reconfigure science and science curriculum in a manner that could help science students prepare for life in the 21st century. Henrietta will listen intently and attempt to become part of the conversation, although not everyone in the conversation will be able to hear her.

Chapter Summaries

Each chapter will begin with narrative, followed by dialogue written as a play. Following the action of each Act, there will be a postscript discussion concerning the ideas that developed through the dialogue.

Chapter One (*Introductions*) will provide a detailed introduction to this dissertation inquiry. I thought it might be helpful for me to introduce myself and my reasons for wanting to create this conspiracy in education with Henrietta Lacks. Act I brings Margaret Hoffen to the stage to meet Henrietta Lacks. Following this introduction Margaret begins a journey of telling her story about Henrietta. Margaret shares her feelings about the importance of story of Henrietta Lacks with the teachers in her department, her students, graduate students, and finally Henrietta Lacks herself.

Chapter Two (*Informing Curriculum with Stories*) has several purposes. The narrative begins in a science classroom. The chapter outlines the aims of my dissertation work in conjunction with my work in the classroom teaching students science and creating a multipurpose science curriculum. Act II conversations that take place at Margaret's school show how she is thinking through the dissertation process from the perspective of a researcher. The work of several curriculum theorists concerning stories and storytelling is discussed. Tom Barone's work with text and the sharing of text with students is highlighted in the postscript discussion. Barone's work for sharing stories provides a possible framework for sharing the story of Henrietta Lacks with high school biology students.

Chapter Three (*Enter the Other, Artists, Playwrights, and Scientists*) is a progressive collage. This chapter begins with a description of Henrietta and a student named Matthew as

"other." It explores how a standardized curriculum and standardized teaching method cannot meet the needs or forge a necessary classroom relationship with the other. I propose in this chapter that these relationships can be forged through the creation of a space between art and science.

The setting of the chapter then shifts to an imaginary academic meeting being held at Johns Hopkins University, called the World Alliance of Science and Science Education, is being held in honor of the 60th anniversary of HeLa cells being grown in culture. It is here that Margaret's bookshelf comes to life and she gets an idea that writing a play about science could be a possible way for her to present research inquiry about Henrietta Lacks. Next Margaret finds herself in a conversation concerning an art exhibit that simultaneously displays Henrietta Lacks and her HeLa cells. As she sees art and science meeting in this display, she decides to investigate playwriting further. The work of Robert Casti, Ming Fang He, Patti Lather, Robert Lake, Rebecca Skloot, and others provide the framework for an inquiry into books written as conversation. Meanwhile there has been a robbery in the conference exhibit hall.

Chapter Four (*Enter Henrietta Lacks*) begins with the story of how Henrietta first traveled to Johns Hopkins for medical treatment. Act IV launches with the stories of several individuals who have mystical encounters with Henrietta Lacks on their way to the World Alliance of Science and Science Education meeting. . During the opening session at the meeting, Margaret hears the story of Henrietta Lacks as told by four writers, Roland Pattillo, Hannah Landecker, PriscillaWald, and Rebecca Skloot. These authors not only share Henrietta's story, they offer aspects of her story that need to be included in science and science education for the sake of social justice.

Chapter Five (*Conspiracy to Interrupt Philosophy and History of Science*) begins with an explanation of why Henrietta Lacks was known only as HeLa and not Henrietta Lacks. As the conference continues in Act V, Margaret attends a session in which philosophers and historians of science are given the task of determining what science education and science curriculum should look like in society and classrooms today. The works of Sandra Harding, Bruno Latour, Hans Jorg Rheinberger, and Michele Serres provide the framework for this intellectual discussion. There is a disturbance at the meeting; The session is characterized by noise and interruptions.

Chapter 6 (*Conspiracy to Interrupt Science and Science Education*) opens with a story of how HeLa cells became the very first cells to be grown in culture. Act VI highlights a group of curriculum theorists having a discussion about what science in schools should look like. Works of curriculum theorists Peter Appelbaum, David Blades, Nancy Cartwright, Hannah Landecker, Patti Lather, Priscilla Wald, and John Weaver provide the framework for this intellectual conversation. The group is challenged to create a list of requirements for science curriculum and then compare their work to the work of the philosophers in the previous session.

Chapter 7 (*Theory Meets Practice*) introduces Henrietta's daughter Deborah. Deborah and Rebecca Skloot make a trip to Johns Hopkins to see Henrietta's cells. In Act VII, the action moves from the meeting at John's Hopkins to Margaret Hoffen's school. Margaret is meeting with a group of curriculum theorists to discuss her ideas of science and science education and how her teaching practice has been informed by curriculum studies. Works by Angela Calabrese Barton, William Doll, Madeline Grumet, Ming Fang He, William Schubert, and Joseph Schwab provide the framework for this intellectual conversation. High school students provide noise, interruptions, and insight that inadvertently drive the conversation about science education,

science, curriculum and social justice. The curriculum theorists visit Margaret Hoffen's classroom in order to determine if theory can indeed meet practice. Students provide their responses to the story of Henrietta Lacks.

Chapter 8 (*Students Join the Conspiracy and Wear Red to Honor Henrietta Lacks*) shares a narrative about the first Wear Red to Honor Henrietta Lacks event at Margaret Hoffen's school. Act VIII is a one-act play that picks up where Act VII left off. The story of Henrietta is relayed in a school-wide assembly. Students and special guests give their account of Henrietta's story and why it is important to science, science education, and society as a whole, and why it is important to them personally.

In this theoretical study written as a play, I will explore how a marginalized, nameless, faceless, African-American woman, ravaged by science and society, could find her way into the conversations of science scholars, curriculum theorists, educators, and present-day high school students. I will explore how science can seep into the core, cracks, and crevices of present-day education and society. The purpose of this inquiry is to examine the relationships that evolve between science and all its participants. Can a linear standardized curriculum become multidimensional through the addition of the perspectives and stories from *The Immortal Life of Henrietta Lacks*? Can the stories from Skloot's book provide a bridge for science to be connected to the lives of students, their curriculum, their community, and their world? Can Henrietta's story become a presence in science curriculum at the university level, in high school classrooms, science classrooms, schools, and venues where policymaking takes place? Can A Conspiracy to Resurrect Life in Schools and Science Curriculum take place in a high school classroom?

CHAPTER ONE

INTRODUCTIONS

My Role

As a matter of formality, I want to introduce myself before we begin this adventure into conspiracy and resurrection. I am a wife, mother, daughter, sister, student, and teacher. Over a 24-year career, I have taught students science at the elementary, middle, and high school levels, though not necessarily in that order. My teaching career began in a middle school. I moved to a high school position and worked part time while my husband and I started our family. This part-time position allowed me to spend more time with our two boys, born 17 months apart. When my part-time position was eliminated, I went to teach science in an elementary school right across the road from my high school. This afforded me the luxury of a working schedule that coincided with my children's school schedule. I spent eight years teaching fifth grade language arts, math, and science. During these eight years, I supervised over 1000 science fair projects—completed during the school day in the classroom and school's computer lab. When my elementary teaching schedule no longer assisted with meeting the needs of my family, I went back across the road to the high school. My new teaching assignment there included teaching high school biology.

I must say that I love teaching students at all levels. I have survived a multitude of initiatives and trends in education, everything from whole language instruction to STEM (Science, Technology, and Engineering and Math instruction geared toward gifted students in my district). I have witnessed segregation, racism, and gender discrimination, all justified in order to

raise student test scores. I have always maintained a personal principle to teach students first, not just a curriculum. This dissertation inquiry involves many characters and many stories.

As a new biology teacher, I felt it wise to follow an experienced teacher's lead. I followed her scripted PowerPoint lessons and worksheet protocols, but found myself longing to give my students more. In a collaborative meeting, I shared that I was reading my students excerpts of Anne Sayre's book *Rosalind Franklin and DNA* concerning the discovery of DNA. In this activity, students participated in a debate to discuss whether Maurice Wilkins had any right to Franklin's pictures of the DNA double helix that he removed from her desk and secretly showed to James Watson. The story continues with James Watson and Francis Crick going on to win the Nobel Prize for their model of the DNA double helix and Franklin dying of ovarian cancer. I was very excited about this activity…but I was chastised by a patronizing voice…saying, "Now Margaret, this is a great story, but we have to get students ready for their EOCT." She concluded her statement with "there is simply not enough time to add these stories and debates and still get through the required curriculum." This discussion only added fuel to my concerns and inspired me in my efforts to give students more. I continued working both sides of the classroom door. On the inside of the door with my students, I shared stories about the scientists behind the science required by the curriculum, regretting that there was not more time to research and bring even more stories to the curriculum. On the outside of the door: "Yes Ma'am that was a great EOCT review. Thank you for sending it to me." Every now and then I would pitch one of my ideas at the weekly collaboration meetings: The results were always identical—I would leave the meetings feeling defeated.

As my frustration grew, I knew that I was going to have to enter into a bigger conversation, and to do so I was going to need a bigger voice. Put "doctor" in front of my name,

I thought, and then I will have a voice with more opportunities to be heard; a voice that could speak with different audiences. I greeted the application process to Georgia Southern University's doctoral program, the admittance essay, and the required testing with much enthusiasm. The acceptance letter came in the mail. At orientation, John A. Weaver placed in my hands my first reading list. Once I picked my chin off the floor, I carefully devised a specific diet of pages to be read daily, always carefully marking pages and taking notes simultaneously… thinking, working, and wondering. Instead of hearing the voices of a few mentor teachers and possibly the voices of my mother and father, the number of voices in my head was multiplying dramatically. Before long there were many new and necessary conversations occurring: Conversations with professors, classmates, and authors. By expanding the single conversation in my head, I began to question every aspect of my life as a wife, mother, daughter, sister, friend, and teacher. Nothing in my life would remain untouched by this thing the Georgia Southern University catalogue called, "Curriculum Studies." Curriculum…I thought I knew all about curriculum. I had taught 20 years. I could write beautiful lesson plans and wonderful rubrics. I had attended countless hours of staff development. I expected the doctoral program to be about writing rubrics and lesson plans and doing quantitative studies that others could repeat. At the beginning of my first class, Weaver (2011) explained: "We are not curriculum and instruction. We do not do lesson plans, rubrics, learning outcomes, or standardized tests. We think, read, write, and talk." Dumfounded, I embarked on one of the most incredible journeys of my life. It would be during our third class meeting that I was introduced to Henrietta Lacks.

Act I Scene I: Class Meets Henrietta

Characters in order of appearance: Anne, graduate student; John Weaver, professor of Curriculum Studies; Margaret Hoffen, graduate student, Caroline, graduate student.

The year is 2011. A group of doctoral students is meeting with their professor, John Weaver, in the Georgia Southern College of Education building. The class began with a discussion of their upcoming research paper, and then turned to discussion of post-humanism.

Anne: At what point do we consider something posthuman?

John Weaver: "At its core the posthuman condition implies the merging of humans and machines in order to enhance or improve human capabilities" (Weaver, 2010, p. 11). There are multiple ways to consider what makes us posthuman. We have cyborgs and fyborgs. "The cyborg (cybernetic organism) is the more traditional term created to describe any human who is permanently connected to a mechanical devise such as a prosthetic limb, an organ transplant, a pacemaker, or an altered gene sequence" (p. 11). Computers make us post-human. Ocular implants make us post-human; the Internet makes us posthuman. Think about a student with prosthesis. First, only the privileged student will have what they need medically, because only the privileged will have health insurance, and this might lead to a state-of-the-art prosthesis. Someone who is poor will not have insurance or the prosthesis. Kind of like the family of Henrietta Lacks. Her cells revolutionized medicine as we know it, and her family cannot even afford health insurance. Margaret, you know about Henrietta Lacks, right?

Hoffen: *She began to squirm uncomfortably in her seat. She was used to Weaver's questions concerning science being directed her way. Caroline kicked her foot under the table in an attempt to bring an answer out of her more quickly***.** No, I have never heard of Henrietta Lacks. What is a fyborg?

Weaver*:* "A fyborg (functional organism) is a more recent term and describes more effectively humans whose lives are enhanced because of some form of biotechnology" (Weaver, 2010, p. 11). "A fyborg maintains an intimate relationship with technology but unlike the cyborg the mechanical intersection is not permanent. A fyborg is someone who undergoes regular kidney dialysis, has a hearing aid, wears eye glasses and perhaps in the near future benefits from come stem cell procedure" (p. 11). Back to Henrietta. Henrietta was the source of HeLa cells. HeLa cells were the first human tissue to be grown outside the body. The book about her is called the *Immortal Life of Henrietta Lacks*. He holds up a book with an orange cover.

Hoffen: Okay (*still red, still worried her response would disappoint her professor; she slid forward in the large rolling desk chair*). I have heard of HeLa cells. I heard about them a long time ago in a cell molecular biology class. (*At least she thought she remembered. Or maybe this was the response that just sounded better than—"Nope…I don't know about HeLa cells or Henrietta Lacks*.")

Weaver: The HeLa cells came from Henrietta Lacks, and scientists have used her cells all over the world. The cells have been used to create vaccines, cures for cancer. At first, George Gey sent them free. Then they were distributed from a lab at the Tuskegee Institute for about "$25.00, for a tiny glass vial of HeLa cells" (Skloot, 2010, p. 193). What is sad is that her family cannot afford health insurance. They never received a dime from the distribution of her cells. Another guy, John Moore, lost, won, and then lost his rights to his own spleen in the California Supreme Court. His cells have become part of another cell line.

Anne: Wait a minute, you mean these people had no control over what science did with their bodies?

Hoffen: Who wrote the story about Henrietta?

Weaver: Rebecca Skloot—S-K-L-O-O-T.

Hoffen recorded the author's name. Weaver looked at his watch and knew they must move on. Later that day Margaret ordered the book from Amazon.com. It was the end of the semester and time to get to work on the two 20-page papers she needed to write. She also had to pick a topic for her final project for her undergrad pre-requisite class. Several days later, the book arrived. I will take a break and read just a little, she thought. The house was quiet, no one home, why not. A few minutes would be a good break from her papers…she could go back to her pressing assignments refreshed.

That break did not end until Rebecca Skloot's entire work, *The Immortal Life of Henrietta Lacks,* had been eagerly read. At the time, I did not know that it would be through this text that my dissertation inquiry would germinate, take root, and began to grow. When the book arrived, I promptly dropped everything and began to read. By page three, I was hooked. Skloot describes the cell by saying "the cytoplasm buzzes like a New York City street" (Skloot, 2010, p. 3). I began to make a list of all the science lessons my students could learn from this book about Henrietta. I continued to read.

In the opening chapter, Skloot tells about Henrietta jumping out of her car and entering Johns Hopkins Hospital. "She scurried into the hospital, past the 'colored' bathroom" (Skloot, 2010, p. 14). Soon I was reading that "[in the] era of Jim Crow—when Black people showed up at white-only hospitals, the staff was likely to send them away, even if it meant they might die in

the parking lot" (p. 15). On this day, Henrietta would be seeing Richard Wesley TeLinde, one of the top cervical cancer experts in the country. TeLinde "often used patients from the public wards for research, usually without their knowledge" (p. 29). Many scientists at the time believed that "since their patients were treated for free in the public wards, it was fair to use them as research subjects as a form of payment" (p. 29). I was starting to see that science justified the use of the innocent for its advancement. I could not stop reading. Suddenly the basics of cell biology, memorizing the function of the mitochondria, learning what happens in the nucleus or on the ribosome, did not seem so important. What did seem important was that all the advances made in cell biology were made because a doctor took Henrietta's cells without her permission. These HeLa cells became the first human cell line created for research. More importantly, these HeLa cells came from a real person, with a real family.

As I was continually thinking about Henrietta, and beginning my journey into the field of Curriculum Studies, I knew the two would intersect in many ways. I had always used storytelling in my teaching. This passion began as a way to integrate literature into the required science curriculum. As I began to share excerpts of this story with my students, the basic lessons in science took a back seat. Issues of social justice became the forefront of class discussions. Students made connections with Henrietta as a person, Henrietta as a Black woman living in a time of racism and segregation, and Henrietta's identity in relation to science. As a teacher, the standards on the concrete wall were fading…forced integration of literature for the sake of Common Core became less and less important with each class discussion. Students were taking a stand for social justice as they discussed how Henrietta should have been treated. It was obvious they felt the need to stand up for human beings such as Henrietta Lacks. I wanted to do more than just share Henrietta with my students. I wanted all the biology teachers to do the same…I

wanted to share the story with the whole school. At the time, I did have reasons, but as time went on, I realized that reasons for wanting to share were quite complicated. I told my professor that I would love to take my project district wide….state wide….The journey would not be as simple as my love and enthusiasm for Henrietta and my students.

Act I Scene II: Henrietta Lacks Goes Back to High School

Characters in order of appearance: Margaret Hoffen, graduate student/classroom teacher and Cathy Osmond, assistant principal

In preparation for planning a school-wide Wear Red to Honor Henrietta event to introduce the entire school to Henrietta Lacks, Margaret goes to visit the administrator in charge of special events. Hoffen taps on the open door.

Hoffen: Mrs. Osmond, I need to talk to you about Henrietta Lacks

Cathy Osmond: Nope, that is Mr. Hardy's part of the alphabet. He has the L's.

Hoffen: You don't understand. Henrietta is not a student. She is a woman whose cells are very important to science. Have you heard about the book—*The Immortal Life of Henrietta Lacks*?

Osmond: Oh, I am sorry. No, I have not heard about the book. (*Mrs. Osmond was still a little startled that Henrietta was not a student having a discipline issue*.) That sounds very interesting. What exactly do you want to do?

Hoffen: I plan to keep it simple. I want to send some information out to all the teachers for them to share with their students. I want all the students, teachers, and faculty to wear red. The biology teachers are going to use the book, *The Immortal Life of Henrietta Lacks*, to

teach a lesson on that day. I was also thinking we would play some swing music at lunch. Henrietta and her cousins would empty all the furniture out of her living room on Saturday night. They would crank up tunes by Benny Goodman and Duke Ellington and dance all night long.

Osmond: Just keep me in the loop. That all sounds fine.

Act I Scene III: Science Department and Henrietta

Characters: Margaret Hoffen, graduate student/teacher; Department Chair, Delores Pequod and Penny Middleton, science teachers

Later that day, Hoffen meets with her science department. She shows the group the copy of the book, *The Immortal Life of Henrietta Lacks*.

Hoffen: I am so excited. Mrs. Osmond has cleared us to have a special day to honor Henrietta Lacks**.** I read this book this summer (*she holds up a copy*). Henrietta's cells were the first to be grown outside the human body. There is so much information in the book that goes along with our biology standards. Random House has sent me copies of the book, if anyone would like to borrow one. I have posters from Random House for everyone!

Department Chair: Let us know what you want us to do…but keep in mind…we don't have a lot of time to spare—lots of standards to cover. I will say this is a great way to get those common core objectives into your lesson plans.

Delores Pequod: We barely have enough time to teach the curriculum now; how are we supposed to drop a whole day to teach something that is not a specific standard? I might have a benchmark[3] that day.

Hoffen: *Feeling very defeated upon hearing the negative but true comment.* I am not asking for a whole period, just a few minutes to tell the students about Henrietta and her HeLa cells. Everything you need will be in a PowerPoint. I know we don't have a lot of time, but I think it is important to share this story. There are so many lessons about ethics in science, and the cells themselves. *She was obviously rattled. She could feel the other teachers' piercing stares behind her back as she addressed the department head.* We are all required to document how we are implementing the Common Core standards in our lesson plans. I will send you lesson plans for the event, including the specific standards covered, so you can just pop them into your lesson plans for that day. It is also a great opportunity to connect science to the world. The students might find the science more interesting if they see real-world connections.

Chair: Sounds good. We all have to document the standards—this sounds like an easy opportunity.

Penny Middleton: I think it would be great for the students to debate whether or not the doctors had the right to take her cells without permission. The students could write a short paper supporting one side or the other.

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[3] Benchmark assessments are given to students each grading period to see if they have mastered the standards being presented during that grading period. The benchmark does not count for a grade. The benchmarks in my biology classroom are given in the school computer labs. Benchmarks are also used for teacher assessment.

Hoffen: That is a great idea. I also think it would be helpful for the students to see how information about cells in the book is different from how the information is presented in their textbook.

Pequod: Well this is all well and good for you Biology folks, but I don't really see how it can relate to physics. I don't have ethics standards.

Hoffen: The book has many examples. Mrs. Pequod, your students could study the mechanics behind Gey's drum roller. It was crucial for the cells in culture to be in constant motion. Interestingly, he never applied for a patent for the machine. He just passed the idea on to others…all for the sake of science. I think addressing the idea of science and ethics with all of our students would be time well spent. There is also the history involved…not only the techniques developed for science, but the fact that the face of medicine changed forever because of this woman's cells. I have a list of science-related topics matched up to passages from the book. I will send those out to everyone.

Like all meetings, most everyone in the room just wanted the meeting to be completed so they could go back to their classrooms and get ready for the next day. The meeting ended. Hoffen was very excited, but also very anxious. She went about making preparations so the plans of the day could be implemented without any effort exerted by the participants. She knew some would participate and some would not.

The event was called, "Wear Red to Honor Henrietta Lacks." Why wear red? This is the most touching part of the story. After a painful bout with cancer, Henrietta Lacks passed away at the Johns Hopkins Hospital for Negroes on October 4, 1951. Mary, assistant to clinical

researcher George Gey, went to the morgue to collect her last sample from Henrietta. When Mary saw the body:

> She wanted to run out of the morgue and back to the lab. Then Mary's gaze fell on Henrietta's feet, and she gasped: Henrietta's toenails were covered in chipped bright red polish. When I saw those toenails. I thought, oh jeeze, she's a real person. I started imagining her sitting and painting those toenails, and it hit me for the first time that those cells we'd been working with all this time and sending all over the world, they came from a live woman. I'd never thought of it that way. (Skloot, 2010, pp. 90-91)

When it came time for the Wear Red to Honor Henrietta Lacks event, students donned red t-shirts, red ribbons, and red beads to show homage to Henrietta. These students led class discussions and shared the story of Henrietta as they went through their school day, becoming activists and speaking up for social justice.

Act I Scene IV: New Teachers in Construction Class

Characters: Matthew and Anthony, high school students; Margaret Hoffen, graduate student/teacher; Wayne Cooper, construction teacher

A buzzing cell phone fell off the desk. She heard the sound from across the room. So engrossed in reading her students' project work on Henrietta Lacks, Hoffen wondered who could be needing her. Her planning period was already short enough. Reluctantly she put the poem she was reading in the fourth period stack of papers. When she picked up the phone, she was surprised to see that she had a message from the construction teacher. Please come to my room…ASAP. She let out a big sigh. The room was on the other end of the school. She would have to hurry.

She walked into a surprisingly empty construction lab. Usually this area was humming with the sound of power tools. Then she turned the corner and saw the classroom. Two of her biology students were working at the marker board. Talking to a whole class of boys…who were all listening very intently to what their classmates were saying. Hoffen stood back, so she could listen without being seen.

Matthew*:* Her cells were different. They were cancer cells; they grew very fast. Gey figured out how to make the cells grow outside the body—this way scientists could study them.

Anthony: Her cells looked like this**.** *He drew the outline of a cell on the marker board and drew in two nuclei.* Cancer cells grow like crazy. They start going through mitosis over and over again…you guys remember PMAT? Prophase, metaphase, anaphase, telophase, the steps of mitosis. We know about mitosis because scientists studied Henrietta's cells.

Matthew: It was sad that Henrietta was in a colored ward. They took her cells without her permission or her family's permission. Now that was just wrong.

The bell rang and the students discovered their teacher standing outside the classroom door.

Matthew: We did not know you were here, Mrs. Hoffen. We taught the whole class. Were you standing here the whole time?

Hoffen*:* I only caught the end of the class. Wow. What a great job. Anthony—great picture of mitosis! You two are great teachers.

Matthew: Mr. Cooper showed us the PowerPoint you sent to all the teachers. Some of the guys had questions he couldn't answer so I volunteered. I like this story, Mrs. Hoffen. I feel bad for her family.

Anthony: I did not know I really understood mitosis until I started talking in front of them. They really had a lot of questions.

The construction teacher walks up to the group

Cooper: I had to send you a text. I thought it was pretty amazing that these two had spent the class period teaching a class full of ninth-grade boys. I figured you would not believe me unless you saw it with your own eyes.

Hoffen: Thanks so much! You guys have made my day…But now you two better get to class. We will have time to talk later.

The teacher was so surprised to be in a high school construction class and hear her students discussing the importance of HeLa cells. They also saw fit to talk about the injustice done to Henrietta and her family. Matthew[4] is an African-American male in the special education program at this school. He was placed on a transitional diploma because he could not pass the math required by the state of Georgia. Anthony suffers from severe ADHD, and often has trouble completing assignments and working in the classroom environment. Both of these students excelled in biology. Did hearing this story allow them to have success in what otherwise might have been a very difficult class filled with rote memorization? Did mitosis gain meaning because they read about it in The Immortal Life of Henrietta Lacks*? Both students connected to the story. Both were engaged in science and the story.*

Students often asked if the story would have been different if Henrietta had not been Black, if Henrietta had not been a woman. With these questions, students contemplated issues of

[4]Matthew's character is based on an actual student. His name has been changed in order to protect his privacy.

medical ethics, civil rights, and basic science principles with a multiplicity of lenses including their own race and cultural backgrounds; these ninth- and tenth-grade biology students began to include the examination of racism, sexism, and violations of basic human rights as part of their science education.

Fast forward to present day: The school has hosted four Wear Red to Honor Henrietta Lacks events to date. My doctoral coursework is completed, and my life has forever changed by participating in reading, writing, and conversations concerning Curriculum Studies over the last three years. My classroom has changed too. An oil painting of an African-American woman hangs on my classroom wall. You guessed it. The woman in the painting is Henrietta Lacks, and her name is included at the bottom. She is depicted with long hair sweeping toward her face as it frames a beautiful smile. Colorful double-helical, deoxyribonucleic acid molecules line the edges of the canvas. This work of art gives face to a woman who remained nameless from her death in 1951 to 1974, when her family learned that her cells were living in laboratories all over the world. A high school biology student created this artwork in order to fulfill the requirements of a project-based assessment for Georgia Performance Standard, "SB1a": "Students will analyze the nature of the relationships between structures and functions in living cells" (Georgia Department of Education, 2011). Part "a" of the standard says that students will "explain the role of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction" (Georgia Department of Education, 2011). I do not see Henrietta's name in the standard. Do you? Why would I even bring up Henrietta Lacks in a science class? A professor of mine commented on a discussion post—"I don't see what Henrietta Lacks has to do with Science." In my head, I started working to make a case for Henrietta having a place in science. The more I shared the story of Henrietta Lacks…the more I

felt she should have a place in my science classroom, maybe all science classrooms. I also knew there were other stories of importance being ignored in high school science classrooms.

My passion for Curriculum Studies began growing almost as quickly as my passion for sharing Henrietta's story. We all know we cannot do anything in a school without justification. A major issue was interfering with my teaching. All my passion, according to my district, was supposed to revolve around the standards posted on the concrete wall. I would soon understand that these standards were the root of my nightmare.

As a classroom teacher of 23 years, I have observed that teachers and students are in a constant struggle to find meaning in these predetermined day-to-day activities mandated by standards and curriculum maps. These trends are not unique to my district. Educational researchers write about the problem. Nussbaum (2010) states that, "Socratic active learning and exploration through the arts have been rejected in favor of pedagogy of force-feeding for standardized national examinations" (p. 19). If these trends continue, we will have "suicide of the soul" (Nussbaum, 2010, p. 142). Teaching to the test often replaces activities that one would expect to find in science classrooms. Unfortunately, it appears that "school science lacks the vitality of investigation, discovery, and creative invention that often accompanies science in the making" (Kokkotas, Rizaki, & Malamitsa, 2010, p. 380). The challenge for science teachers in the current age of standardization involves their finding a way to switch the dial from rote memorization to a "process of discovery and intellectual debate" (Weaver, 2001, p. 20).

In the beginning, my thoughts of changing the curriculum involved making efforts to include stories about science while teaching the standardized curriculum. I found that by adding simple stories to my curriculum, students were more inclined to look into the required science

information. I grew very passionate about the stories I was adding to the curriculum—how could I as a responsible teacher leave out historical accounts of how science was and is being made? The required objectives for biology are very straightforward. "Storytelling could be regarded as a suitable strategy to meet these objectives" (Kokkotas, Rizaki, & Malamitsa, 2010, p. 381). Teaching the standards alone would bring about instruction that to my students may seem abstract and disconnected. Adding stories involving the history of science and the human aspect of how the science came about "has the potential to contribute to the humanizing of teaching, to the improvement of the climate in science classrooms, and to the development of positive attitudes towards science learning. In this context, the understanding of science concepts is expected to improve" (Kokkotas, Rizaki, & Malamitsa, 2010, p. 381).

I also began to think that by learning about the actual people doing science, my students might feel more connected to science. By humanizing the science standards with stories, storytelling allows students to be taught "in a manner that respects and cares for their souls as opposed to a rote assembly line approach" (Berry, 2005, p. 37). Teaching the standards and the story makes for a natural addition of culturally responsive pedagogy. Berry (2010) suggests that our plight as teachers must be grounded in "theory and practice" (p. 24), as well as by working hand and hand with students, bringing actual concerns of the community to the table. I must take the theories involving culturally responsive pedagogy, building relationships, and alternative pedagogies into account when planning instruction for my classroom, although the curriculum itself is strictly standardized. "Education should help young people live deeply, fully and wisely" (Morris, 2008, p. 129).

Intellectual debate can begin with simple conversations about stories. Conversations have a huge role in addressing issues in learning. Can the simple act of allowing teachers and students

to give voice to their concerns result in conversations and possibly lead to learning? Wang (2006) offers the following concerning conversations:

> As we converse, talk, and learn from each other, we come to realize that perhaps there is no definite beginning or end. Wherever one starts, as long as the interactive dynamics between person and structure and between self and other can be kept instead of abandoned, one is open to the creative potential of an intertwining, evolving, and transforming process engaging both self and culture. This process of teaching, conversing and writing does not offer any resolution or formula… there is no discourse or practice inherently liberatory or empowering, but our pedagogical desires, discourses, and practices are complicated along the way to reach new possibilities….going beyond any promise to open up alternative paths. (p. 35)

How does one go about creating opportunities for conversation in the science classroom? How can conversations be used to enhance a curriculum? Remember that Curriculum Studies is all about reading, writing, and talking.

As I began exploring conversations, I found myself seeking opportunities to write conversations. Fortunately, my professors were open to alternative styles of representation. I knew that I wanted my dissertation to reach a broad audience. I also knew that I wanted the language to be accessible. Michele Serres (1990, 1996) tells us that "technical vocabulary seems immoral: It prevents the majority from participating in the conversation, it eliminates rather than welcomes, and further, it lies in order to express a more complex way things that are often simple" (p 25).

I wondered if my writing concerning educational theory and my own classroom practices would appear clearer when written in the form of a story or a conversation. What if science lessons were written as stories? It's worth noting that my writing background up to this point has been truly technical. My master's thesis consisted of five traditional sections—Research, Hypothesis, Method and Materials, Results, and Conclusion—resembling the basic scientific method, 100 graphs, and 100 data tables. Writing conversation was very different. My first attempt at writing a conversation was a discussion between two teachers. My next attempt included a fictional setting. What started out as a simple dialogue became multidimensional because in that format, time and space components can be manipulated. I felt that adding fictional elements would expand the boundaries in which I was working. I would read an author, and wonder what this author would say to another…maybe from works written 100 years apart. Some authors were not in the same field. In a formal style of writing, facts and opinions can be regurgitated. I did not feel that a technical style of writing would allow me to tell my story. I wanted to take the authors that I was studying, put them in the same place at the same time, and get them to address current issues with science and science education. I could demonstrate how over the course of reading the works of many authors, the reader assimilates the information and uses the information to work through questions or problems. As time continued, the play that I had not intended to write was being written and performed in my head. As my head churned constantly about my dissertation, the settings and conversations began to take shape. What would Michele Serres, Bruno Latour, Donna Haraway, and others from my course of study have to say about Henrietta Lacks? Could I have a conversation with Henrietta?

My personal excitement concerning the story of Henrietta Lacks was becoming part of me. I continued using *The Immortal Life of Henrietta Lacks* in my classes and shared the story

with others, mainly my students, but something in the back of my head kept nagging me. I was confident that this story has value in the classroom in relation to science, history, and ethics of science. The Wear Red events have been very successful. Students were having complicated conversations about science, HeLa cells, Henrietta, even racism. The school superintendent borrowed a copy of the book. Teachers stopped me in the hall to share that they felt it was a worthwhile event. What worried me was how my excitement about this story might be misunderstood. I felt very self-conscious telling Henrietta's story because I am and always will be white. Can a white woman of privilege tell the story of an African-American woman who experienced racism each day of her life? I knew that nothing that I had experienced in my life, no matter how oppressive it may have seemed at the time, could be equated to the racism that so many African-Americans have endured. Technically "counter stories are told from the perspective of the marginalized and are intended to challenge the universality and often the efficacy of the majoritarian story, not simply in its context but also in its very structure" (Baszile, 2009, p. 10). The truth was and still is: I have an overwhelming desire to tell this story and any other story that might help my students connect to science and the world in which they are such a vital part. Concerned that my African-American students might think that I was trying to gain attention, I simply told the story as viewed through the lens of science. While gathered around a table full of graduate students and professors one Saturday afternoon, I posed the question: How can I share this story without my students, teachers, community members, viewing me as racist?

Act I Scene V—Dinner Table Discussion

Characters in order of appearance: Anna, graduate student/teacher; William Schubert, curriculum theorist; Ming Fang He, curriculum theorist; Cabrala, graduate student/teacher; Mimi,

graduate student/teacher; Margaret Hoffen, graduate student/teacher; and Michael, graduate student/teacher

Graduate students have gathered at the home of Ming Fang He and William Schubert for lunch following a morning class. It was the last class meeting of the semester and students were enjoying small talk and their time together. Everyone was wearing their slippers—compliments of their host.

Anna: Does she cook this much when it is just the two of you?

Schubert: Not usually this much. You know, usually a couple of vegetables…maybe a little salmon.

He (*from the kitchen*): But I cook for others too…the men that put on my new roof. They loved my cooking. Anyone want rice, just a little bit…?

Cabrala: I want the tofu recipe.

Mimi: I want this salmon recipe**.**

Everyone was busy eating and chatting. Hoffen has a question she has been wanting to ask. Was this the right time? Was it okay to interrupt the casual conversation with a question concerning her research?

Hoffen: I have a question for everyone. You all are always very supportive of my work. I am so grateful to have such a great group. (*She needed to ask this question. Was this the right time? She took a deep breath.*) I need everyone to be very honest with me: When you hear me, as a white woman, tell the story of Henrietta Lacks, do I portray any part of the story in any way that could be perceived as racist? Will my African-American students

think I am racist when I tell this story? Am I exploiting Henrietta in any way by telling her story?

Anna: "I find the difference in race secondary to the importance of the story. The similarity of gender binds you in challenging the male dominated field of research and medicine. Your position as a teacher to multiple races and genders positions you in a place to widen their worldview as well as emphasize the continuing work necessary in the field of social justice. You are not looking to assume her voice but highlight her struggle and bring it to the forefront for more readers and possible leaders of the community" (Waddell, 2015).

A voice from the kitchen interjects a question into the conversation.

He: Could a white man not tell this story?

Anna: Good question Dr. He.

Hoffen: I think anyone can tell this story. Part of the class activity involves every student telling part of Henrietta's story. This will include the white males. I must be prepared to guide them as they tell this story of a Black woman. The activity provides all students an opportunity to examine gender roles, their own and the roles of women.

Schubert: "I would say that you should honestly characterize who you are and why you hold Henrietta Lacks in such high regard, even noting too the possible criticisms and, despite them, why you are moved to make her the centerpiece of your work. You have a highly defensible implicit rationale for doing so and you need to make it explicit. That's my take" (Schubert, 2015).

Hoffen: Thanks, Dr. Schubert.

Michael: "I suggest you simply tell the story and make the focus about Lacks. Write it in a way that if your name wasn't attached as the author, people would perceive the writer as being Henrietta Lacks herself" (Williams, 2015).

Dr. He emerges from the kitchen to sit down with the group.

He: As researchers we are "immersed in lives, and take on the concerns of people who are marginalized and disenfranchised, and act upon those concerns" (He & Phillion, 2008, p. 2). Just remember that no matter how much time you spend studying them, or how much you know about them, you "cannot become their voice" (He M. , 2014). I think your students will see that your goal is to "advocate for disenfranchised, underrepresented, and invisible groups and individuals…to foster social justice for educational and social change" (He & Phillion, 2008, p. 3).

Cabrala: "I think that you can present it in a way that is logical and rational. I think the telling wouldn't be exploitation if you give a reflexive statement upfront about your position as a white female. If you are candid about this, then I think you will appear transparent and authentic to your audience" (Awala, 2015).

Hoffen: Thanks, Cabrala. I want my students to know I am sincere. A doctoral candidate at Emory wrote a letter opposing Rebecca Skloot's portrayal of Henrietta's story. Her name is Rebecca Kumar. She says that Skloot begins the story with "racism on the first pages of the book" (Kumar, 2012, p. 3). Her main objection was that Skloot says in the opening that *The Immortal Life of Henrietta Lacks* is a work of nonfiction. I read it for myself, but honestly did not question. Skloot spent 10 years researching. Skloot does this on the first page, first sentence of the book—let me read it to you. "This is a work of

nonfiction. No names have been changed, no characters invented, no events fabricated. While writing the book [she] conducted more than a 1000 hours of interviews" (Skloot, 2010, p. xiii).

The woman objecting to Skloot's telling does not disagree that Skloot was very diligent in writing the book. Kumar says that it is impossible for Skloot to write truthfully about events that she herself did not witness, "the style and content of the story is ultimately the result of her choices…Skloot's descriptions are loaded with political implications and consequences…Skloot has control over the voices" (Kumar, 2012, pp. 3-4). I guess when any of us write, we are taking control of the story we are telling. The passage she objects to from the book describes Henrietta finding her tumor while in the bathtub. How can Skloot know what happened? Why not just say up front that "it could have happened like this" (p. 4)? Kumar also feels that Skloot's nonfiction telling of the story in the voices of Henrietta's family "reads like a Looney Tunes character" (p. 4). Honestly, at first I chose to brush over the article and ignore Kumar's concerns. The more I thought about it, the more I realized that there will be many opinions about *The Immortal Life of Henrietta Lacks*. Just because it is a best seller, and I think it should be used to teach science and social justice, does not mean that it was written for that purpose alone. Kumar (2012) says that Skloot goes "out of her way to make black life seem strange, funny, and sometimes with her depictions of religion, misguided and uninformed. And this makes [Skloot] the voice of normalcy—authoritative and god-like" (p. 5).

Anna: Interesting; I can see how you cannot ignore this.

Hoffen: Another issue that comes to mind involves victory stories**.** After my first presentation at the Curriculum Studies Summer Collaborative session, Jim Jupp mentioned that when working with students in multicultural settings we have to make sure we are not just trying to write a "victory story" (Jupp, 2004 p. 36). I had used the word victory in my presentation; Sweet victory…was the expression that I used. It embarrasses me now. I said I felt as if using *The Immortal Life of Henrietta Lacks* helped me connect with my African-American students in class. For the first time a group of young men seemed to be interested in biology. Each day I found myself redirecting this group of boys. Jupp sent me an article that discussed how when we are teaching in "multicultural settings, we as white educators can get hung up on our personal victory of making opportunities available to students that are of a different background" (p. 36). Through careful self-reflection, "members of the privileged majority need to reflect and be aware of their intentions and make sure that they are not just going in to save the poor, the needy, and the minority" (p. 36).

Michael: Students who have experienced oppression will see right through this.

Anna: Have you had anything like this come up in your classes? Students are honest. I am sure if they felt your intentions were racist someone would have spoken up and said—how do you know about being a Black woman with cancer.

Hoffen: Students are very honest. My students are very receptive to the story. I am very self-conscious about this…I feel like the White teacher…maybe because I have been called this—not in reference to Henrietta…but when I had to discipline a student who disagreed

with her consequences. Do you guys remember reading Robert Coles in Chapman's documentary class?

Anna; I do. I love the story of Ruby Bridges.

Hoffen: Bob Moses, the leader of the Robert Coles research group, writes a very understandable description of white privilege. I wrote it down in the back of my *Immortal Life* book:

> Don't you see, that's been our story—the black story—everyone calls us something! It is so hard for any single one of us to be seen by you folks [white people], even the kindest of you, even our friends [among you] as a person, nothing more. That is where we are; that is where we are coming from; that is our 'place' in all this! You can be here and you can be there. You can go set up your tent wherever you think it'll do you good! That is great for you. That's what it means to be white, and have a good education. You can look at things with a microscope or a telescope, and from way up in the mountains and down near the seashore, when it's sunny and when it is raining cats and dogs, and then later, when you write or you publish your photographs—you're not a white writer or a white photographer. You're free of the biggest label of them all, the one that defines us every single minute of our lives. (Coles, 1997, p. 40)

This conversation took place during the heart of segregation. I think having these difficult conversations concerning race is absolutely necessary. Will we ever get to a point in the South where no one has to be sensitive when discussing issues of racism? Will I ever just be the teacher that cares about her students? Can inviting Henrietta into my classroom make a difference in how students view racial issues in school and society?

Hoffen felt like she had dominated the conversation long enough. The conversation picked up concerning other issues with other students' inquiries. To herself she thought:

I wish I could talk to Henrietta. She had a story so different from anything I have experienced. How many of us have had our cells sent up to outer space? Henrietta and her parents, who were sharecroppers in Virginia, farmed the same land that their ancestors had worked as slaves. Armed with only a 6th grade education, Henrietta—a wife and mother of five children—entered the world of white coats at Johns Hopkins Hospital, complete with a "colored" bathroom and water fountain and segregated wards, and proceeded to change the course of medical history (Skloot, 2010, p. 13).

Act I Scene VI—A Conversation with Henrietta

Characters in order of appearance: Margaret Hoffen, graduate student/teacher and Henrietta Lacks

In the bottom left corner of a dark stage, a teacher sits in a classroom. On the white board in front of the classroom is a painting of an African-American woman. The teacher, Margaret Hoffen, is speaking to the painting. Her classroom is empty.

Hoffen: (*Sighing deeply and shaking her head as her seventh-period students rushed out the door*.) Wow, Henrietta, what a day, I feel like we need to have a conversation. You have been part of my teaching for four years now—I hope you are not offended that I am so taken by your story. Your journey into "the land of white coats" at Johns Hopkins Hospital as a wife, mother, and cancer victim in a time of segregation has opened my eyes to events in history and science that were lacking in my science education (Morris, 2008, p. 11). I realize that so many just know

you as HeLa, not Henrietta. I have studied your story so much, I feel like I know you and your family.

Your family believes "your spirit [has] lived on in [your] cells, controlling the life of anyone who crossed its path" (Skloot, 2010, p. 7). Some may feel that this is scientifically impossible, but who am I to question the beliefs of your family and those closest to you. If this is true, your spirit has blessed me. I see great things happen when I share your story to my biology students. Some might think I am crazy…believing in your spirit. Rebecca Skloot had some doubts about this at first. I like how your daughter, Deborah, set Skloot straight: "How else do you explain why your science teacher knew her real name when everyone else called her Helen Lane" (p. 7)? I cannot explain how I just happen to be in a doctoral program with another teacher that knew your name. Hearing your story changed my life, my teaching, my understanding of science, forever. Is your spirit—along with your cells—immortal? Others hearing your story, sharing your story, writing your story, allow your story to become as immortal as your cells.

I hope you understand that it is my desire to make your story come to life, resurrected from the grave, in the hearts and minds of my biology students. As they live and share your story, maybe you can become immortal like your cells. Your story—complete with issues of science, history, ethics, and race—is full of opportunities for students to situate themselves in another place and time. These young people can make the world know that it is the people like you, Henrietta, who cannot be disregarded in science, or in any other aspect of life and living.

I always ask students how they think your family felt after learning that your cells were still living in laboratories all over the world, 25 years after your death. How could your family

deal with your physical death as they were engaged in a "lifelong struggle to make peace with the existence of those cells, and the science that made them possible" (Skloot, 2010, p. 7)? I am constantly reminded of your family's struggle with doctors only calling when they wanted something, strangers calling wanting to ask lots of questions. Was your son Lawrence right when he said that you would want them to see "that there is a positive side to everything, even when things were 100% awful" (Lacks, Lacks, & Lively, 2013, Chapter One, paragraph 6). Your cells have helped "millions, if not billions of people all over the world" (Chapter One, paragraph 5). Lawrence imagines that you would be "extremely happy about helping others" (Chapter One, paragraph 5). Your cells became a miracle for humanity—all humans with no regard for race or class—yet no one knows your name.

Lawrence, in speaking of his reason for telling your story himself, says it best: "I want everyone who knows about my mother's cells to know her as a person too. I want everyone to get a sense of her sweetness and humor and spirit in spite of all the hardships life dealt her" (Lacks, Lacks, & Lively, 2013, Chapter One, paragraph 9). I agree with Lawrence, but do I have the right to tell others your story? Are you okay with my reasons for wanting to tell your story? I believe that your story can ressurect life in my science classroom. Is this exploitation? So many of my students feel that the science they are reqired to learn is disconnected from the practice of science. I want the students to feel connected to the science they must learn. I want my students to know that they are part of a science. Just like you. Things can get so confused and so misunderstood in our mixed-up, profit-seeking world.

My doctoral research and my work in and out of my classroom is a search for understanding. In this search I will be relying on the words of others. I want to assure you that I will not put blind faith in their words. I want to say up front that it will be a work of fiction. I

don't think human composition can be anything but fiction. I seek truth…but truth is complicated. I have learned in my graduate studies that individual narratives, our stories, support the truth we portray. This makes truth a composition. We as individuals are composite characters made of truths and untruths. We choose the truths we want to be a part of ourselves and then we portray those truths in our daily life. The person we see and believe ourselves to be may be very different from the truth that our everyday audience, our family and coworkers, may see. Somewhere between the fiction and truth, subjectivity and objectivity, we will find what we consider our personal reality. In my writing, I have come to accept that everything I represent may be limited to the desired sense of truth I wish to portray. This sense of truth may not be considered an objectively truthful representation because of the subjectivities I bring to each keystroke, each word composed. This truth may be a contradiction to how others perceive the story I write.

With this said, I realize that my accounts of your story as well as the accounts and actions of other characters in my story can only be those of fiction. I will rely heavily on the accounts of your life offered by your family: Deborah, Sonny, Zakariyya, Lawrence, and Bobbette. I will complete a careful study of the book written by Rebecca Skloot, *The Immortal Life of Henrietta Lacks*. I will consider the praises and the criticisms of this text, in order to tell a version of the truth. I specifically say version, because truth can be relative.

My biggest fear in embarking on this journey is that someone may consider me a racist. My desire is not to "perpetuate" or "endorse" the blatant racism faced by your family, "faced by [you] and a countless number of poor women whose bodies were and continue to be exploited in the pursuit of 'knowledge'" (Kumar, 2012, p. 5). As a white woman, I am aware that my life came with a multitude of prepackaged privileges. I was not aware of my privileged life until I

returned to school to begin working on a doctorate…more evidence that I am indeed privileged. I know that crossing boundaries, pushing against pre-established borders of society, and attempting to understand a life lived outside of my race in a distant place and time is a complicated proposition. I hope you will know that you will be the foundation for the resurrection I hope will take place in my classroom and in my teaching, a resurrection in education that I hope will lead my students to an immortal love of learning. I hope the students will understand their role in what becomes immortal in our society. I dream of classrooms, communities, and all of society that are full of social justice for all participants. Don't you think education should cover social grounds just as well, Henrietta? I think my students can see how things in our world need to change because they learn about you and your struggle as a woman living in an era of segregation. Maybe these lessons can become as immortal as those infamous cells of yours!

Hoffen walks to the door, flips off the lights, and leaves the stage. The picture of Henrietta is illuminated and the audience hears a voice.

Henrietta: My name is Henrietta Lacks. The world only knew me as HeLa. Several have made attempts to hide my story. Several have attempted to tell my story. The fact remains that all who hear my story will write their version of it, composing, weaving, and navigating in a sea of complicated issues. I dare you to become part of this conspiracy. I dare you to become entangled in my world, a world of medicine, science, and racism. A world that desperately needs change. Who knows, the changes might begin right here in this classroom.

Postscript: Meeting Henrietta

This intellectual dialogue over the course of Act I serves as a painter's palate or a chalkboard upon which to compose ideas. The dialogue is multifunctional. First it tells a story of a researcher who wishes to share the story of Henrietta Lacks in science class. We see Margaret starting her graduate studies and working in her school. The Curriculum theory she is exposed to in her coursework begins to inform her teaching practice immediately. Secondly, the conversations brings to light issues that teachers face when wanting to make changes in a standardized curriculum. With the current emphasis on testing and evaluation systems, the priorities are all about standardized testing. Anyone not involved in schools can see how the process of curriculum works in school. Teachers must have the support of their administrators and their department in order to do anything new. Third, this intellectual conversation provides insight to how a doctoral graduate student begins to develop a theoretical research inquiry. Coursework and conversations help doctoral students find their way to their dissertation inquiry. Only in a work of fiction could Henrietta be part of a conversation concerning issues of science, science education, and social justice in schools.

CHAPTER TWO

INFORMING CURRICULUM WITH STORIES

A Classroom Story

Rebecca Skloot (2010) "first learned about HeLa cells and the woman behind them in 1988, thirty seven years after her death, when she was sixteen and sitting in a community college biology class" (p. 2). Her instructor, Donald Defler, was teaching the class about the cell reproduction cycle. On an overhead projector he placed a schematic to describe the process of mitosis. Skloot (2010) describes the diagram as "a neon-colored mess of arrows, squares, and circles with words [she] didn't understand like 'MFP Triggering a chain reaction of Protein Activations'" (p. 2). A student across the room immediately asked if the diagrams had to be memorized. The instructor replied "yes" and added before anyone could ask "the diagrams will be on the test." Defler continued discussing "how mitosis—the process of cell division—makes it possible for embryos to grow into babies, and for our bodies to create new cells for healing wounds or replenishing blood we've lost" (p. 3). "We learned that by studying cells in culture." He grinned and spun to face the board, where he wrote two words in enormous print: Henrietta Lacks. Skloot explains that she was waiting for him to continue. Instead he erased the board. Class was over. She wanted to know more about the story. Her head filled with questions. "That's it? That is all we get? There has to be more to the story?"(p. 4). She followed Defler to his office. "Where was she from? Did she know how important her cells were? Did she have any children" (p .4)? Defler responded by telling Skloot that there was no more.

I could end this retelling of Skloot's introduction to Henrietta Lacks by saying Rebecca Skloot was so inspired that she went on to write a bestselling book telling Henrietta's story and

the story of her family. That is a wonderful point. I will forever be grateful for her work and commitment to uncover Henrietta's story. If you will, join me in examining this story from a teacher's perspective. Defler was teaching his class. Specifically teaching students part of the science curriculum that involves cell reproduction. I teach this information every year during the first grading period. I laughed out loud when the student interrupted his teacher's lecture by asking "Do we have to memorize everything on those diagrams?" (p. 2). By taking a moment to mention the name Henrietta Lacks, this teacher was inviting his students to connect to an otherwise very technical curriculum filled with words like "MFP Triggering a Chain Reaction of Protein Activations" (p. 2). At that time there was not much of the story he could tell his students. What about Rebecca Skloot's story? Why was Rebecca the student who followed him back to his office? She was a sixteen year old trying to make up her biology credit—she had failed biology her freshman year. I think about this setting and I see stories intersecting.

Earlier I shared the story of how I was introduced to Henrietta Lacks. Following this introduction I had no doubt that Henrietta Lacks and her story would become the heart and soul of my dissertation research. When I examine my personal journey in the dissertation process, I see that sharing Henrietta's story with my students came first. During discussions in my graduate courses and in writing assignments for these courses I was working to find a way to explain how the story of Henrietta Lacks was informing my teaching. I began asking: How could the story of Henrietta and my stories relating my experience teaching students about Henrietta become a research inquiry that could possibly inform Curriculum Studies? I said that I was grateful to Rebecca Skloot for writing Henrietta's story. I think I also have to be thankful to her teacher for introducing his entire class to Henrietta Lacks. The book that resulted, *The Immortal Life of Henrietta Lacks,* has paved the way for the world to hear Henrietta's story. This work of

literature provides a pathway for teachers to introduce Henrietta's story to their classes. I know that I cannot just tell my students a story. I must be able to tell a meaningful story and then communicate the results of this telling in my dissertation. How will this telling be done?

The following scenes describe two conversations concerning the dissertation process. In the first one two students describe a magic formula for writing a dissertation. In the second one Margaret Hoffen speaks for the first time about possibly writing her dissertation in the form of a play. These discussions allowed Margaret to contemplate what kind of dissertation she would write. The conversations brought up some very important things that one must consider when writing a theoretical dissertation. This dissertation would result in the researcher learning how to share the story of Henrietta Lacks. Using class time to tell a story would have to be justified and connected to the mandatory standardized curriculum.

Act II Scene I: Conversations Continue—The Magic Formula

Characters in order of appearance: Suzanne Hager, Sabrina Leberg, Margaret Hoffen, and Anne Newton, all graduate students and teachers.

Georgia Southern graduate students have checked into the Statesboro Cozy Inn, following a long day of class. Two very excited students tell Margaret Hoffen that their wonderful teacher has given them the magic formula for writing their dissertations. They offer to send her their notes.

Suzanne Hager: This guy is amazing. He has told us step by step what we have to do for our dissertation. Have your professors prepared you for writing your dissertation?

Hoffen: What do you mean? I did not know there was a formula for writing a dissertation in Curriculum Studies.

Sabrina Leberg: *Very defensively*—yes there is. The professors in your strand are not preparing you for the dissertation level.

Hoffen: *Feeling cornered by these two students, she replies calmly*—my dissertation is going to be theoretical.

Hager: What do you mean theoretical? You have got to have a method, collect data, and analyze your data. I am telling you, we have the formula.

Leberg: I know you did not like this instructor when we had him for statistics…but he is better in person that he was for our online class. He is wonderful. He showed us the outline and the schedule. This is going to be easy. When are your Curriculum Studies professors going to give you the magic formula?

Hoffen: Magic formula? *Getting a little exasperated at this point.* You are not hearing me. I am not writing a traditional dissertation, with a study and statistics. My professors are encouraging me to write a book about my work with Henrietta Lacks. I will actually write the dissertation inquiry in the form of a book. Sure, I will have research questions, but there is no set-in-stone format for my inquiry.

Hager: You better be careful. Without the magic formula you will never graduate.

Hoffen: Let me explain this one more time. Our dissertations are going to be different.

Leberg: Oh, maybe you mean you are going to do a qualitative study and interview people and code your interviews like we did for our qualitative research class.

Hoffen: That was enough coding to last me a lifetime. I see the value. I have a lot of respect for people that take the time to conduct interviews and code data. I respect those researchers

who complete a quantitative study complete with statistical analysis. All forms of research can be valuable. Do you both know that the writing process is actually a way of collecting data? Have you read Robert Lake's dissertation? He created an imaginary conversation between Paulo Freire and Maxine Greene. Dr. He had us read numerous dissertations—all somewhat creative. Some of them were amazing—I can send you the PDF's.

Hager: So you are just going to write. I think you are missing something. You better find a way to figure out what is going on. I am sure the requirements are the same for all of us.

Hoffen: Not really, but okay. Goodnight ladies, I think it is time for me to go find some dinner.

Hoffen leaves the room frustrated and confused. This was not the first discussion concerning how the dissertation process would evolve differently in the different strands. Was there some kind of competition going on or were they deeply concerned that she was not going to be successful in earning her degree. The entire group had been very close…until the divorce occurred. Their graduate program consisted of two different strands: Teaching and Learning and Curriculum Studies. Hoffen had chosen Curriculum Studies early on. The two students above had decided to take the more traditional Teaching and Learning strand. There seemed to be a lot of tension between the two groups. A professor from the Teaching and Learning department had commented early in the program… "Those Curriculum Studies folks on the 2nd floor—we don't know exactly what they do." Hoffen felt that each person had to pick what was best for them. She was also sure that she wanted to create a work that would be accessible to researchers in either field.

Anne: Are you okay?

Hoffen: I feel like I was just ambushed.

Anne: *Anne knew she had gone to visit the other students.* What did they say?

Hoffen: Well—we, my friend, are doomed. We don't have the magic formula to write our dissertations. Obviously—THEY HAVE THE MAGIC FORMULA. *She says with a sigh.* They got it from our favorite statistics professor.

Anne: A magic formula for what?

Hoffen: A magic formula to write our dissertations

Anne: But our dissertations are going to be different. There is no formula.

Hoffen: I know. I remember Weaver telling me on the phone before I even knew if I had been accepted into the program that he could teach me how to write a dissertation without any statistics. Not only is he teaching us…we are doing this. I had no idea how controversial others would find this type of work. Our two friends downstairs are currently feeling horrible for us because our professors are not helping us figure out the magic formula for writing our dissertations…

Anne: I honestly appreciate their concern. They don't understand and they may never understand.

Hoffen: Have we done anything to make them think that we do not value their work? Why can't the two strands coexist and see the value of each other's work…Why is it always a binary…The right way — which is obviously the Teaching and Learning strand, and the

wrong way, which is Curriculum Studies? What is wrong with something in-between…maybe a little of both?

Anne: Well you know we are going to get that a lot. We have to write our way through it. The battle between quantitative vs. qualitative has been waged for a long time in education. I am thinking we will not have to wage that war. Like Bill Ayers told us in Philadelphia: It is okay to be creative, as long as the creativity is grounded in theoretical scholarship. Don't worry; we are being prepared for what we will need to do. Anytime someone thinks there is a magic formula, I get worried. Let's get some dinner.

Now Margaret was not sure what her dissertation would look like. Were her friend's arguments right? She was heavily involved in a class where she was researching forms of inquiry and theoretical frameworks. Her head was constantly spinning about theoretical frameworks and educational inquiry. She knew story telling would be a crucial part of the dissertation. However, much to her dismay there was no such category that actually matched up exactly with what she wanted to accomplish. That magic formula might be the way to go.

Act II Scene II: A Play?

Characters in order of appearance: Phoebe, graduation coach; Hoffen, graduate student/teacher; Mike Price, teacher; and John, physical education department chairman

Several months later at Hoffen's school it's a typical day at school. Hoffen passes Phoebe as she comes out of the teachers' lounge.

Phoebe: Are you Dr. Hoffen yet?

Hoffen: Not yet (*smiling her fake little—they only care about when I am going to finish—smile*), I am ABD.

Phoebe: All but dissertation right?

Hoffen: Yep!

Phoebe: So what kind of study are you doing? I don't think I could fathom collecting all that data. Statistics—Yuck! I guess you could do a survey or an interview, but it all includes data right…just like our classrooms…Data driven.

A recent doctoral graduate passes by and chimes in on the conversation.

Mike: That is what my dissertation looks like…Hoffen is trying to save the world. I could not have read all the stuff she is reading.

Hoffen: Thanks for the encouragement, Mike. *She raises her voice slightly so he can hear her as he makes his way down the hall.* You know quantitative research has a purpose as well. I want to read yours! *She turns to Phoebe*. My dissertation is actually evolving into a play**.**

Phoebe: They consider play writing research? *She looks surprised.*

Hoffen: (*If I can't explain this all to a friend, how on earth will I write a valid, well-accepted, respected dissertation?*) It is theoretical, aesthetic. Curriculum theorists have worked long and hard to cross the boundaries of dissertation writing[5]. It is not just a play for the sake of a play. It is not for entertainment…although I do want people to enjoy reading it…or maybe even enjoy seeing a production. Unfortunately, most think of qualitative studies as simple descriptive studies, involving surveys, interviews, all of which still must be completed in a formal step-by-step "scientific method." Teachers must consider relationships in the classroom and relationships developed between participants and the

[5] See Pinar, Reynolds, Slattery, & Taubman, 2008 and He & Ayers, 2009 for a tracing of this history.

curriculum in order for real meaningful learning to occur. In order for understanding to happen, there must also be different forms of representation. Remember the American Educational Research Association (A.E.R.A.) conference I went to in Philadelphia last spring? We all presented our research in spoken word form.

Phoebe: Are you going to start having your students rap the results of their experiments in your Biology classroom?

Hoffen: Well there is research that shows that rapping, hip-hop, and other forms of pop culture have significant value in the classroom.

Another teacher overhears while passing by.

John: As the head of the P.E. department, I plan to have all my teachers using hip hop in the classroom *(he continues walking).*

Phoebe: He is kidding. I know you are serious. It is all about having an open mind. Your students love you. As a graduation coach, I know your students are your top priority. It helps for them to like you. It helps that you are teaching and not boring their brains out—all that Drill and Kill. You can tell me more later.

Hoffen: Sure, thanks for asking. *I know Phoebe, you think I have lost my mind talking about writing poetry, building relationships in my classroom, wanting to teach more than a standardized curriculum, wanting to write a dissertation that will explore resurrecting a voice of a woman who has been dead for 65 years. After being so cocooned in Curriculum Theory when taking classes or at conferences, it is becoming obvious that a case for a creative dissertation is going to require a well-developed root system. This root system must be able to create gaps in people's thinking…especially when they are fans of the "but it has always been done this way" philosophy. It is easy to make a case*

when surrounded by like-minded people…but they do not need convincing. I want my work to be meaningful to a big audience. Where do I start?

Postscript: Personal Ponderings Concerning Educational Research

The two scenes above are included in the dissertation to show how my ideas about educational research have evolved through coursework and discussion with colleagues. These scenes were based on actual conversations. Through writing the conversations, I was able to reflect upon my thinking and put ideas together concerning the dissertation. As I explained in Chapter One, my background was heavily steeped in empirical research. I had a difficult time wrapping my head around a study that could involve something other than crunching numbers and running statistical analysis. Data collection can be a very useful tool, but as an educator, I knew that not every question in education could be answered with quantitative data. Thankfully an argument for something other than quantitative research in education had been waged many years previous to my personal contemplations. "These epistemological debates are now of peripheral interest to those of us who have moved beyond quarrels over quantitative and qualitative. For many of us…these debates have been over for twenty years" (Pinar, Reynolds, Slattery, & Taubman, 2008, p. 53). "Qualitative research has extended to nearly all areas of educational research, including those spheres interested in school…in which researchers and teachers form collaborative relationships to make curriculum change" (pp. 52-53). Eisner and Peshkin (1990) say that "Qualitative inquiry pervades human life, and qualitative thought is a requirement for maintaining one's humanity" (p. 367).

Grumet (1990) argues that "qualitative inquiry is an art rather than a science" (p. 101). While researchers using qualitative methods are "no longer radically disassociated from the object of our inquiry and subjugated to the epistemolotical loneliness that plagues the scientist,

we bring together that which science has separated and declare our connectedness, our continuity with the world" (Grumet M. , 1990, p. 101).

Tom Barone (1990) "suggests that the future truths [of educational research]" will include "accomplished pieces of literary fiction with educational themes" (p. 319). He would like to think that one day "reading a doctoral dissertation will mean entering a virtual world that offers a fresh perspective on the reader's own *Lebenswelt*" (p. 320). "What kind of utopian vision is this? It is dismissible as idle daydream only by ignoring the history of the last quarter-century. More and more, qualitative educational inquirers are finding their own voices" (Barone, 1990, p. 320). "Thin description and systematic methods are features that are generally debilitating to the process of sharing useful stories" (p. 321). Useful stories written phenomenologically, along with "biographies, autobiography and educational criticism" with the best "examples of these genres the reader is created by a voice that conveys, more strongly and consistently than in most ethnography, a sense of personal authorship" (p. 319). Could I write a useful story? Could I write a useful story about Henrietta as a person who became a major contributor to medical research while remaining nameless? As a teacher could I write a useful story showing how stories evolve in teaching practice involving relationships between and among all the participants in a classroom? I also had to consider why I wanted to write these stories. What was my motivation?

After reading the story of Henrietta Lacks, I became very passionate about telling her story. She was only known as HeLa, yet she did so much for medical science, so much for the world. She was a real person reduced to being an anonymous cell donor. The next step in this process was asking questions. What does Henrietta have to do with my students? What does Henrietta have to do with my classroom? I noticed a very simple correlation. My students

through the process of standardized testing and a standardized curriculum were becoming nameless faces sitting in desks, identified only by their scores on the required standardized assessment. My students were a lot like Henrietta, nameless, faceless, and unable to use their own voices to speak up for themselves. I began to recognize and embrace this responsibility to speak for the unheard and speak up for those being oppressed. As an educator I should care deeply for my students, their stories, and their experiences. The more I know about them the more I can help them. This knowing creates the "personal authorship" that Barone (1991) speaks about (p. 319). After a conversation with a student in my class about standardized testing, I composed a poem that contemplates how students perceive what is going on under the current conditions placed on my teaching practice.

Do you hear my voice?

I sit on the second row, third seat back

I come every day. I do every assignment.

You say we have to work hard—our hard work will forge our futures

I do work hard…just like you I want more

I want more from you—my teacher

I want more than a cookie cutter education

Measured up with standardized portions of English, math, social studies, and science

Each in their individualized serving dish

You have taught me that I am made of cells,

With DNA in my nuclei, powered by mitochondria

I am muscles, bone, and more

The blood that pulses through my body is vital and living

My brain stores an imagination rarely used

I am made of carbon compounds working together in a beautiful symphony

But, I am more than molecules connected with covalent and hydrogen bonds

I am made of stories

Stories told to me

Stories I compose as I live each day

I want time and space to tell my story

Space and time to write my story…live my story

You tell me—

Can this storytelling be done between the bells?

In the halls

Within the walls of the classrooms where I spend my days?

Day after day

You cover material in an orderly map

Things that interest me do arise, I raise my hand

I see sheer panic in your teacher eyes

No time to go off map…time to answer and time to explore

Instead of going deep, you hover but a moment

Before violently moving on to the next prescribed standard

The next part of the lesson listed on the carefully written lesson plan

Leaving me detached and empty

My story ignored

My story untold

Me, left to hold on to my emptiness, detached for another day.

I know you hear my voice, I know you can see my sorrow through my smile

Behind my eyes

I know you see me as more than a category or a number on your differentiation checklist.

But yet you ask and I bubble answers to questions that matter little to me

Oh, for the time to ask and the time to answer

In a place unscripted, an outcome un-prescribed

Education might become meaningful to me.

I could become a teacher, my teacher a student

Learning taking place side by side

I have a story, I have a voice

My question today is

Do you, my teacher, have a choice?

What can you do?

Teach the standards… alone, isolated, carved in stone

Or teach to the heart to the soul of each one …noting each special face,

Creating each a special place

Constructing bridges between you and me, and a curriculum that gives me reason to fly

Leading, guiding, side by side through many miles—we both ask

What is worthwhile?

Of my teacher I ask, Come sit by me—we will converse

And write beautiful poetry verse by verse.

Together we will compose that story…the journey of three…my teacher, the curriculum and me.

When I put my pen down and read my own words, I felt like I had a lot in common with my student. We were both students actually; the young lady in the classroom has attended school for 11 years. I was also very determined to be the best teacher possible for my students, willing to learn on a daily basis in order to teach my students first, a subject I love, and a mandatory curriculum. Both of us truly disturbed because our love for learning was diminishing before our eyes. I have never considered myself a poet, so this was a departure for me. Michael Apple notes that educators:

> Not only care for individuals and groups whose pasts, presents, and futures have been and will continue to be dominated, but one also cares for traditions, for forms of meaning that enable personal and political power to make sense. It is this caring for meaning in all its forms that enables poetry to emerge, that shows the openness to experience that characterizes education rather than indoctrination or training. (Apple, 2000, p. 91)

Reread this quote and insert the word science so that it reads: "It is in this caring for meaning in all its forms that enables poetry to emerge, that shows the openness to experience that characterizes [science] education rather than indoctrination or training" (Apple, 2000, p. 91). Poetry can be a vehicle to describe science, and how individuals experience science. I had used poetry to tell a student's story. Now I was back to my original question. How will I tell Henrietta's story? What other options are available?

Journey into Narrative, Storytelling, and Science

Stories are told in many ways. Why not a novel, a poem, a play, a painting, a photograph, a graphic presentation, a documentary? All of these are ways of telling a story, each unique and extremely complex in its own way. Each with its own individual entities that allow it to be classified as scholarship.

Science is a very complex subject to study. Donna Haraway (Haraway, 1989) tells us that certain aspects of science itself may be considered a kind of storytelling practice: "a governed, constrained, historically changing craft of narrating the history of nature" (p. 4). Within the social constructs of school, teaching, and learning there are many opportunities for stories. I see stories as a more comfortable or informal way to share and converse with others. We share stories everyday through conversations. Can lives be changed with storytelling? "Everything and everybody has a story" (Baszile, 2008, p. 253). Baszile gives some excellent points in learning how to use storytelling in the classroom. Stories can be used as "a primary form of communication," to help "define problems," and to "identify relationships among problems," or they can be employed to help us "laugh at our problems and heal our hurts" and "help us to discover and understand one another" (p. 253). I think this can be extended to help us to discover and understand science curriculum.

In order for storytelling pedagogy to be successful, students and teachers have to get beyond themselves. Both groups have to step back and take a fresh look—to treat oneself as a stranger or an "other." By looking at ourselves as the other, we see the stranger within us. When examining the stranger, we can relate more to the other element in society. This examination "implicates the other in me," such that "my own foreignness to myself is, paradoxically, the source of my ethical connection with others" (Butler, 2005, p. 84). From a curriculum theory perspective, we apply this examination of the other to storytelling: "We bring all our sorted histories, hopes, and desires to the project of curriculum theory, hooking onto familiar stories and creating new ones" (Baszile, 2010, p. 483).

Creating new stories can only come about in classrooms where teachers are willing to address all issues, even those found to be uncomfortable, and allow students to be active

participants in the dialogue. For instance, teachers cannot begin to teach about issues of race until they are familiar with their own personal history, and their own personal attitudes concerning race. Good teaching will result when a teacher incorporates results of careful self-reflection into the required standardized curriculum taught in the classroom each day. Although standardized curriculum does not lend itself to change, good teaching will push the boundaries of standardized curriculum in order to bring about change. In Kieran Egan's (1986) book, *The Great Stories of the World Curriculum*, Eagan employs "teachers as story-tellers" (p. 109). Using great stories in all facets of the curriculum allows students of any age to build a springboard upon which they can begin a process of their own inquiry in any subject. Egan's stories of the world must be based on "science, technology, language, history, life on earth, the stars and planets and so on" (p. 108). Science stories would definitely need to include "what we know about the stories of life on earth, of our place in the universe and of the human ingenuity which discovered the material for these stories" (p. 108). Unfortunately, in our society "science and math are taught as inhuman structures of knowledge…taking pride in their logical and inhuman precision" (p. 30). Looking at curriculum through a postmodern lens[6], as well as incorporating stories, may provide pathways to "rehumanize" science curriculum (p. 30). Characteristics of this postmodern curriculum should call into question "rigid dichotomies created by modernity between objective reality and subjective experience, fact and imagination, secular and sacred, public and private" (Weaver, 2001, p. 8). Science pedagogy created within a postmodern framework will "value personal knowledge as much as empirical knowledge and neither places sources of knowledge into an arbitrary hierarchy nor accepts the universal certainty of empirical knowledge" (p. 11).

[6] Looking at curriculum through a postmodern lens will involve using many perspectives in lieu of linear standardized approach. See Doll, 1993.

Relating to the familiar is a comfortable act for students. The challenge in using storytelling in teaching is to teach students to listen and learn from stories in which they feel no connection at all. Such stories can allow students to see familiar ideas from a completely different perspective. Storytelling teaches students to look for new perspectives by distancing themselves "from the familiar… seeing something for the very first time" (Pinar, Reynolds, Slattery, & Taubman, 2008, p. 415). Butler (2005) says, "It is only in dispossession that I can and do give any account of myself" (p. 37). Discourse with oneself and then with others allows us to form new ideas. This takes a willingness to forget all old and preconceived notions before pressing onward to new territory.

Telling stories employs multiple relationships. Connelly and Clandinin (2000) sum up these relationships by saying, "participants are in relation, and we as researchers are in relation to participants" (p. 189). Participants and researchers may be experiencing similar phenomena, which brings them common ground in learning situations in education. This excerpt from Schubert (2009a) shows the connections between stories, ourselves, others, and education:

Stories

My stories

Whose stories?

Stories of unknown Others

…

In mutual pedagogic relations

Together,

Seeing education

Not as mere schooling

Rather as gathering to explore together…

Improvises who [we are]

Experiencing, knowing, and doing

Needing and overcoming

Being and becoming

Sharing and contributing

Wandering and wondering…

(Schubert, 2009a, p. 229-232)

A storied or narrative inquiry explores this intertwining of relationships and allows us to examine the multiple dimensions present in lives, schools, and curriculum. How will I create stories and use stories effectively in my classroom?

A Method for Using Stories in the Classroom

Barone (2000) verifies that in this journey of self-creation through hearing stories and weaving them into our own stories, there will be "uncertainty" (xi). Barone (2000) speaks of this journey of curriculum, "sans the blueprints" (p. 10) as one that focuses on the two-way interaction between the teacher and student, and their interactions with a curriculum. He says that

"[this] kind of curriculum theory…will arise from the real qualities of the students' experiences of and their interaction with, the ongoing activities, and from the meanings that facets of the curriculum hold for them…curriculum from the students' perspectives" (p. 53). Standardization cannot work here because "[an] individual defines the world from his own perspective" (p. 56). In my classroom, I want to be what Paulo Freire (1970) calls a "humanist, revolutionary educator," putting forth efforts that "must coincide with those of students to engage in critical thinking and the quest of for mutual humanization" (p. 75). In order for teachers to achieve these goals, we must work side by side and build meaningful relationships with our students. Parker Palmer (1998) describes good teaching "as an act of hospitality toward the young, and hospitality is always an act that benefits the host even more than the guest" (p. 51). In other words, all those difficulties we face in our classrooms are made worthwhile when we see our students creating their own love for learning.

Barone (2000) tells us that: "All great literature…lures those who experience it away from the shores of literal truth and out into uncharted waters where meaning is more ambiguous" (Barone, 2000, p. 61). This dissertation will reflect student responses to *The Immortal Life of Henrietta Lacks*. Barone (2000) suggests that, "the reader must imaginatively construct [their] own reality of what [they] read" (p. 61). We must have not only a method for narrative analysis, but also a method to generate information for analysis, and a particular process for gearing narrative analysis toward science. How can researchers have students and teachers create stories based on a specific science topic, in a given time? How does the story composition process begin? I am convinced that the story must come first…and then the careful narrative analysis or interpretations. The issue is that this process may be different for every participant involved in hearing a story. For example, knowing how DNA is sequenced in a laboratory does not mean

much unless students know how this DNA sequence impacts them personally and how this knowledge can impact the world.

Tom Barone (2000) offers some advice on how interpretation of text takes place. This advice can be converted into a "loose" method for sharing stories. This is good for teachers if they think a method is necessary. First, we teachers must "invite our students into the dangerous vessel which will float them away from the safety of literal truth and the twin seductions of ethical sloth and moral intolerance" (Barone, 2000, p. 61). This invitation will arrive in the form of a well-told story, offered by a very prepared and intriguing storyteller. For instance, the students can read an excerpt and then be asked to connect it to the standards being studied. Next, "we must design activities that entice them into paying careful attention to the social and empirical world around them"…leaving "gaps for students to fill in, holes which encourage them to actively intervene in the proceedings to assume responsibility" (Barone, 2000, p. 62). It will be the gaps or transformative spaces that provide an opportunity for the students "to think critically about the significance of that which they have experienced, to wonder how it fits into their own maturing outlooks on the world" (Barone, 2000, p. 62), Thirdly, students need an opportunity "to share their tentative thoughts with teachers and each other, to tear down and construct again any conclusions reached and then to act….stay tuned in to the world and ready to change it" (Barone, 2000, pp. 67-68).

When using Barone's approach to the text students not only get an opportunity to examine the text for specific content related objectives, students will be examining themselves in relation to the story. William Pinar (1994) calls autobiography an "archaeology of self" (p. 202). He explains that our life from infancy through childhood "remains hidden from view" but the memories and experiences form "layers of sedimentation—social, private, of various modalities

and categories that constitute a self" (Pinar, 1994, p. 202). The experience of autobiography allows each layer to be uncovered one at a time: "Autobiography is a first person and singular version of culture and history as these are embodied in the concretely existing individual in society in historical time" (Pinar, 2004, p. 38). Not only are the layers uncovered, it takes effort to dig through exterior feelings and attitudes for the exploration to occur. Janet Miller says, "The new ways of knowing can be strange, alien, and frightening" (2005, p. 76). The process of rethinking all we have ever known may leave us feeling a little ignorant, but we continue to grow and grow—never returning to the ignorance that was present when we began the journey. This process of self-reflection cannot be taken lightly. This process allows each of us to explore our life and make all of our "fragmented selves" a completely understood self (Miller, 2005, p. 76). Miller says the journey must take place in "solitude" (2005, p 76). In education this work helps us unearth a multitude of feelings and attitudes from a unique perspective.

Once we, students and teachers, are willing to explore new territory or text, or look at each other and the world with a different lens, real change may take place in all dimensions in those spaces of transformation. For this inquiry, *The Immortal Life of Henrietta Lacks* will provide a foundation or framework on which stories will be constructed. It will be construction of stories that will bring illumination to the question: Can Henrietta Lacks become part of a high school science curriculum?

CHAPTER THREE

ENTER THE OTHER, ARTISTS, PLAYWRIGHTS, AND SCIENTISTS

Purpose for Conspiracy: The Other

Henrietta Lacks was one of 10,000 women to die of cervical cancer in 1951. A young mother of five, she died a very painful death from an extremely aggressive cervical cancer. The "tumor was biologically unique…a peculiar appearance and a neoplasm which was to prove quite resistant to radiation, for Henrietta Lacks was dead within 8 months with widespread disease" (Jones, McKusick, Harper, & Wuu, 1971, p. 945). Henrietta's body was moved from the public ward, where she died, to the morgue where her "body lay on a stainless-steel table in the cavernous basement morgue. For research purposes, samples were cut from Henrietta's body: bladder, bowel, uterus, kidney, vagina, ovary, appendix, liver, heart, and lungs" (Skloot, 2010, p. 90). Her abdomen was black and charred from radium treatments, and "tumors the size of baseballs had nearly replaced her kidneys, bladder and uterus…her other organs were so covered in small white tumors it looked as if someone had filled her with pearls" (p. 90). While she lay on the autopsy table, "HeLa [cells] with a generation time of about 24 hours, if allowed to grow uninhibited under optimal cultural conditions" were taking over the world (Jones, McKusick, Harper, & Wuu, 1971, p. 947).

Henrietta was taken from that cold table in the morgue and carried back to Virginia to be buried in an unmarked grave. Meanwhile her lauded cells went on to change the history of medicine. HeLa cells make a great science story; why not stop there with HeLa? What does Henrietta have to do with my ambitions of creating spaces, weaving stories, building relationships, and creating a conspiracy to resurrect life in my classroom? The bottom line is

Henrietta was marginalized in more than one way. She was Black living in times of segregation. She was a Black woman during a time in history where women had few rights. She was in a public ward at the mercy of the doctors and nurses taking care of her. I could consider Henrietta as "other" because she is different from me. Then I think, at times aren't we all "Other" depending on the current lens of examination? I look at the students in my classroom. I see students marginalized, as a standardized curriculum is shoved down their throats at breakneck speed without regard to their race, gender, class, or individuality. I cannot ignore the differences between myself and my students. Barone (2000) says that, "indeed, there must reside within the soul of any true educator a respect for those whom he would educate" (p. 18); a respect for all regardless of difference.

The ones we are called to educate are very different from ourselves. "In real life, as in existential novels, we find our "other" in the visitor, the stranger, the old friend, the unusual encounter, the unexpected question, the unfamiliar feeling, the disturbing dream, or the knock at the door" (Doll, 2000, pp. 107-108). As in the classroom, we struggle to extend hospitality to these individuals to put each at ease. Family members, friends, coworkers, associates, plumbers etc., may all at one time or another be a visitor in one's home. I tend to think of someone as a visitor if an invitation has been issued. When dealing with visitors, "I want to be master at home (ipse, poitis, potens, head of house, we have seen all that), to be able to receive whomever I like there" (Derrida, 1997, 1997, p. 53). "The art of associating with people depends essentially on an aptitude (requiring long practice) for accepting and eating a meal in whose cuisine one has not confidence" (Nietzshe, 1974, p. 320). Nietzsche says, "How hard is it to digest one's fellow men" (Nietzshe, 1974, p. 320). We choose to digest and understand or we tend to think we are better

than they are. We are comfortable with people who share similar customs, language, and beliefs. Derrida issues a challenge concerning the other. He calls for absolute hospitality to the other:

> Absolute hospitality requires that I open up my home and that I give not only to the foreigner (provided with a family name, with the social status of being a foreigner, etc.), but to the absolute, unknown, anonymous other, and that I give place to them, that I let them come, that I let them arrive, and take place in the place I offer them, without asking of them either reciprocity or even their names. (Derrida, 1997, 1997, p. 25)

True hospitality is offered to anyone without anything in return. We must forget ourselves and unselfishly consider the "Other." This type of hospitality requires personal risk. We must share power we so want to keep for ourselves as the master of our home. In classrooms, teachers may be somewhat territorial and unable to freely give their hospitality to students due to mandated schedules, high stakes testing, and strict teacher evaluation guidelines. Offering hospitality may seem too personal, when education is the primary goal. Serres tells us we need to get out of our comfort zone:

> For there is no learning without exposure, often dangerous, to the other. I will never again know what I am, where I am, from where I am from, where I am going, through where to pass. I am exposed to others and foreign things. (Serres, 1991, 1997, p. 8)

Derrida issues the call and Serres tells us it is not going to be easy. Encounters with the other require that a change take place in our own being: "The visitor awakens us and 'marries' us to the creative wellspring inside" (Doll, 2000, pp. 107-108). Michel Serres brings up a very important point about visitors in connection to science:

> Science speaks of organs, functions, cells, and molecules, to admit finally it's been a long time since life has been spoken of in laboratories, but it never says flesh, which very precisely, designates the mixture of muscles and blood, skin and hairs, bones, nerves and diverse functions, which thus mixes what the relevant disciplines analyze. (Serres, 1991, 1997, xvi)

Henrietta's cells have been a major topic in science writing and science laboratories since George Gey announced their incredible growth on prime time television. Henrietta's name was hidden. It was all about George Gey's HeLa cells. Serres is telling us that "flesh" should be part of this story even in the laboratory (Serres, 1991, 1997, p. xvi).

Next, I want you to take some time to think about Matthew. Remember, he was the special education student that taught his construction class about HeLa cells and Henrietta Lacks. Matthew is a very nice young man with excellent carpentry skills. I have a stool sitting in the corner of my kitchen that he designed and built in his construction class. He was so proud when he brought it down to my room and presented it to me. He drafted the plans, cut the boards, sanded, and finished this project without anyone's help. A very bright-eyed young man, Matthew always greeted me in my classroom with a smile. A smile, that is, unless things had not gone well in his previous class…Math I. He would get very frustrated. He had repeated the course multiple times. Because of his weakness in math, Matthew had a math support class to help him with his regular math class. Then during his remediation period he was selected to receive tutoring for the Math EOCT. He was not allowed to sign up for the chess club with his favorite construction teacher. Basically, Matthew had to endure three math classes a day. His entire day focused on his documented weaknesses. His IEP (Individual Education Plan) stated his weakness was math problem solving, yet he was required to take the same standardized math tests as all of

the other students in Math I. His scores would be compared to students not requiring an IEP. He viewed himself as a failure. Why not, so did his math teacher. So did the school. African-American males with poor math scores were the reason the school was unable to make annual yearly progress targets. A lifetime of failure…if you view this student only through a lens of a multitude of test scores. He is a score on a printout that indicates that a school is deficient in meeting the students' needs because he did not pass the standardized EOCT at the end of his math class. A dot on a graph.

Matthew's experiences in places and situations other than his math class indicate that he has many gifts and academic strengths. Due to public education policy, Matthew was placed on a transitional diploma track that allowed him to finish school without passing math. Matthew is now attending a local technical school, majoring in business. His mother, his special education liaison, his construction teacher, and I told Matthew day after day that he did not need to let the math get him down. He tried so hard to pass it. He felt like a failure. He begged to take the course again, in hopes that he would pass the EOCT. Had the math been taught in a way that met his personal learning style, had his math teacher been allowed to create an assessment that addressed the math in a different way, I have no doubt that this young man could have been successful. This is no different from my students who speak English as their second language having to take their biology EOCT in English, instead of their own language. So in essence, the standardized test is measuring their language proficiency along with their biology knowledge. Matthew is not just a math score. He is a real person, a talented and gifted individual.

As you read these two stories, did you feel connected to Henrietta? Can you relate to Matthew? It is easy to look away, or maybe not look at all. The shock these images create provides interruptions or "noise" in our thoughts. The visual provided by the text creates a locus

between the unusual and ourselves…a new space has been created. Michel Serres (1991, 1997) would consider the space between the viewer and Henrietta or Matthew a third place…"sown in time and space" (p. 10). A space of transformation will be found in this space between the two opposing binaries. Some might consider this location a bridge, but not in the sense of a bridge constructed with concrete and steel. This bridge is a "site or clearing in which earth, sky, mortals and divine in their longing to be together belong together…these are not mere paths for human transit, nor are they mere routes for commerce and trade. They are dwelling places for people" (Aoki, 1996, p. 5). In an interview, Homi Bhabha calls this dwelling place, "The Third Space" (Rutherford, 1990, p. 211). He says that "all forms of culture are continually in a process of hybridity" (p. 211). In the interview, Bhabha goes on to tell Rutherford (1990) that "the importance of hybridity is not to be able to trace two original components from which the third emerges, rather hybridity…is the third space which enables other positions to emerge" (p. 211). "This third space displaces the histories that constitute it, and sets up new structures of authority, new political initiatives, which are inadequately understood through received wisdom" (p. 211).

Present-day education is characterized by "modes of learning that promote passivity and rule-following rather than critical engagement on the part of teachers and students" (Giroux, 1983, p. 158). "Increasingly, classrooms are places in which teachers and students act out the script given to them by someone else, neither teachers nor students ask the questions that matter, and learning is equated with passing a test" (Hursh, 2007, p. 3). These characteristics lead to standardized disrespect for students and teachers on multiple levels. We would be kidding ourselves if we do not acknowledge the oppression in many forms that continues to exist in our schools. The standards posted on the concrete block wall in my classroom fail to produce "an increasingly diversified, complicated, and contested cosmos" (He, 2013, p. 63). Instead, the

standards are characterized as a "linear sequential, easily quantifiable ordering system," combined with expectations of "clear beginnings and definite endings," a neat and tidy package for teaching, complete with guidelines for delivery (Doll, 1993, p. 3). The predetermined standards lack dimension, as well as meaning, for teachers and students. As students and educators, we can realize the potential of finding a "complex, pluralistic, unpredictable system or network" upon which to build a foundation for educational experiences for students and teachers alike (p. 3).

When individuals are exposed to spaces of transformation, new characters evolve, characters that are unrecognizable from the original ones encountered. Compare a self, yourself, known for a lifetime, with an "other," with whom there is no prior experience, except possibly oppression. When the two meet in this newly created space, each can possibly be personally transformed. By taking two things and placing those in juxtaposition to each other, noise can be created. Change can occur.

Juxtapositions: Art Meets Science Creating a New Space

C.P. Snow (1959, 2013) describes the art-science dichotomy in his lecture titled, *The Two Cultures and the Scientific Revolution*. Snow (1959/2013) believed that "the intellectual life of the whole of Western society is increasingly being split into two polar groups" (p. 4). These two groups are composed of the "literary intellectuals at one pole — and at the other scientists, and as the most representative, the physical scientists. Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding" (p. 4). Snow (1959/2013) explains that "The reasons for the existence of the two cultures are many, deep, and complex, some rooted in social histories, some in

personal histories and some in the inner dynamic of the different kinds of mental activity themselves" (Snow, 1959/2013, p. 23). During this time in history:

> The only means of shedding light on some aspect of the physical world was science, and when it came to issues surrounding human beings, social science was the sole illuminating source. For them, the dominant research paradigm was the experiment and was seen as the gold standard for research. The use of statistics was ubiquitous, and the models to be used in doing research had a mechanistic uniformity. (Barone & Eisner, 2012, p. x)

My original impressions of scientific research were embedded deeply into my psyche while working on a Master's degree in Biology. This brings to mind an image of a small wood-framed laboratory on Frenchman's Bay at the Mount Desert Island Biological Laboratory. I collected mountains of quantitative data—precision and duplication were required. This type of data is important. However, not everything in our universe can be reduced to a data point on a graph, or a number in a table. What happens when we begin to look at science differently, maybe through the eyes of artists or poets?

As a doctoral student, with much prior experience of the basic scientific method, these new ideas of how to approach research have been thoroughly challenged. John Weaver introduced me to two writers that I would not have identified as scientists: Ralph Waldo Emerson and Alexander von Humboldt. I had never heard of Humboldt, an explorer and scientist whose history and ideas have been swept under the proverbial rug. We studied Humboldt through the work of Laura Dassow Walls (2009), Of course, I had studied Emerson in literature class, but Weaver suggested that I examine Emerson's work through a scientific lens. Emerson wrote of problems with empirical science:

> Empirical science is apt to cloud the sight, and by the very knowledge of functions and processes to bereave the student of the manly contemplation of the whole. The savant becomes unpoetic. But the best read naturalist who lends an entire and devout attention to truth, will see that there remains much to learn of his relation to the world, and that it is not to be learned by any addition or subtraction or other comparisons of known quantities, but is arrived at by untaught sallies of the spirit, by a continual self-recovery, and by entire humility. He will perceive that there are far more excellent qualities in the student than preciseness and infallibility; that a guess is often more fruitful than an indisputable affirmation, and that a dream may let us deeper into the secret of nature than a hundred concerted experiments. (Emerson, 2003, pp. 74-75)

Quantitative data has a place, but Emerson acknowledges here that not everything can be measured. Imagine how much knowledge can be obtained if we place ourselves somewhere between science and the world…

According to Alexander von Humboldt (1858, 1997), science is a journey that promises to "lead us through the vast range of creation that may be compared to a journey in a distant land" (p.55). Humboldt (1834, 1993) himself embarked upon many journeys because he desired to see the world "with [his] own eyes a grand, wild nature rich in every conceivable natural product, and the prospect of collecting facts that might contribute to the progress of science" (p. 15). This collection of facts would not "be regarded as a mere encyclopedic aggregation of the most important and general results that have been collected together from special branches of knowledge" (Humboldt, 1858, 1997, p. 55). Such a collection is "nothing more than the materials for a vast edifice and their combination cannot constitute the physical history of the world, whose exalted part it is to show the simultaneous action and the connecting links of the

forces which pervade the universe" (p. 55). Collecting, contemplating, and connecting were all part of Humboldt's approach to science. His goals and desires for his practice of science were complex. He tells us that, "each step that we make in the more intimate knowledge of nature leads us to the entrance of new labyrinths" (p. 41). It will be in such mazes, he argues, that "excitement produced by a presentiment of discovery, the vague intuition of the mysteries to be unfolded, and the multiplicity of the paths before us, all tend to stimulate the exercise of thought in all stages of knowledge" (p. 41).

Why so many connections? Simple collections of facts could be detrimental to the progress of science. Humboldt (1858, 1997) tells us that the "accumulation of unconnected observations of details…may doubtlessly have tended to create and foster the deeply-rooted prejudice, that the study of the exact sciences must necessarily chill the feelings, and diminish the nobler enjoyments attendant upon a contemplation of nature" (p. 40). Don't think for one moment that Humboldt is advocating for some kind of soft or less than scientific pursuit of knowledge. His goal was to propagate "an earnest and sound knowledge of science" (p. 53). He believed that "man [sic] cannot act upon nature, or appropriate her forces to his own use without comprehending their full extent, and having an intimate acquaintance with the laws of the physical world" (p 53). Along with this intense knowledge of nature, Humboldt believed the pursuit of science should be "an inward one—an ennoblement of the intellect—a science that includes "philosophy, poetry and the fine arts" (p. 53). The fields of science:

> Mutually enrich each other and by their extension become connected together in more numerous and more intimate relations, the development of general truths may be given with conciseness devoid of superficiality. On being first examined, all phenomena appear to be isolated, and it is only by the result of a multiplicity of observations, combined by

> reason, that we are able to trace the mutual relations existing between them. If however, in the present age, which is so strongly characterized by a brilliant course of scientific discoveries, we perceive a want of connection in the phenomena of certain sciences, we may anticipate the revelation of new facts, whose importance will probably be commensurate with the attention directed to these branches of study. (p. 48-49)

Humboldt argues that it is through the forging of connections that new knowledge is made, and new understandings achieved.

My introduction to the work of Alexander von Humboldt came through the work of Laura Dassow Walls. Walls (2011) opens her book, *Journey to the Cosmos with Alexander von Humboldt*, with a drawing of a natural bridge between two high cliffs in Icononzo, South America. Humboldt drew this picture himself, sketching "from the northern part of the valley, with a side view of the arch" (Humbolt, Researches, concerning the institutions and monuments of the ancient inhabitants of America, with descriptions and views of some of the most striking scenes in the Cordilleras, 1814, 2011, p. 60). The natural bridge rests upon two high cliffs, "which upon measuring [Humboldt] found to be, one fifteen hundred, and the other thirteen hundred meters in perpendicular depth" from the valley below (p. 54). Walls (2011) wrote that the bridge's metaphorical construction demonstrated that Humboldt not only wanted to explore the world from a science viewpoint, he wanted to create bridges between "peoples, disciplines, places, and historical eras" (p. 10). Connections were a vital part of Humboldt's method of carrying out science. Can science in classrooms or in educational research become a space, a Humboldtian bridge of sorts, where needed discourses can take place and connections explored? Could this space be used to demonstrate to students that they are indeed connected to science and science is connected to them?

Emerson (2003) states that success in science "depends upon elevating science to a creative art—not just marrying science and poetry, but merging the two in a new, prophetic power" (p. 50). To Emerson, "Poetry and science were as close as light and object, speech and air wings and the wind that lifted them" (Walls, 2003, p. 226). In his world, "the only way to recover from corrupting pathologies of social convention was to grow beyond them, as a self and as a community or society, free and self-directed, using the resources of native language, art, poetry and scientific knowledge" combined (p. 235). Is it possible to create such an interdisciplinary relationship? Barone & Eisner (2012) tell us that "Within the 20th century, and now the 21st, regard for this dualism—and, indeed, a science-over-art hierarchy—remains but has increasingly been eroded" (p. x). This erosion has opened the door for new opportunities in research.

Science Meets Art on Stage

In my classroom, I want to tell stories. I want to make sure I share more than a "single story" that might create "incomplete stereotypes" (Adichie, 2009, p. 1). As you have already experienced, I have chosen to write some portions of this narrative as a script for play. Why a play, you may ask? Script writing affords me opportunities that the format of a simple interview or conversation lack. The work began as a conversation among philosophers, university professors, teachers, and students. The conversation gained depth when I made a decision to create fictional settings for the conversations. Before long, the conversation had evolved into a play. Of course I am not the first to do this. Plato wrote *Meno* "about 390 B.C. or shortly after" (Plato, 360 B.C./1976, p. 1). In this conversation, "Socrates is at some pains to make Meno understand the nature of a general definition and to correct the logical mistakes the latter makes, such as failing to understand the difference between a definition and an enumeration of particular

examples, or including the term to be defined in the definition" (p. 1). The conversation records a basic lesson. This basic conversation shows up later in "Phaedo" and the "Phaedeus" (Plato, 360 B.C/1976, p. 2).

By creating fictional settings, people from different time periods can meet and converse. In order to write dialogue in my research papers and eventually my dissertation, I began reading books that were written in the form of a conversation. From them, I decided that it is appropriate to present this section as a conversation. Several types of conversation informed this scene. My work as a graduate student was informed by reading books and articles and then participating in conversations concerning the reading. Some of these conversations occurred with professors, other graduate students, and the authors themselves via email and at academic conferences. Thinking about something we read can sometimes become a conversation we have with ourselves. These conversations are very real, although one person is contributing both parts. I found these conversations very valuable in my work. When we think and talk through something, we are working to understand, and it is through this thinking process that the conversation can inform our thinking as much as an actual conversation. I found that I learned much from real conversations, conversations I had with myself, and conversations that I created fictionally.

The conversation portions of the play will take place at The Johns Hopkins Hospital, a non-profit academic medical and research center in Baltimore, Maryland. In an attempt to bring science and scientists together in a historical and collaborative setting, I created a fictional academic conference. The World Alliance of Science and Science Education Symposium is being held February 3-8, 2016. Sessions to honor the 65th anniversary of HeLa cells are also on the program. The anniversary of the first cells to be grown outside the body is monumental to medical research. This anniversary also marks the day that a woman named Henrietta Lacks had

a tumor removed at Johns Hopkins. Her cells were taken during a biopsy of a tumor. The lab assistant who took the cells placed them in a test tube of culture media and labeled it HeLa. He for Henrietta, La for Lacks.

The first session of this conference involves a group of authors discussing books that are written as conversations.

Act III Scene I: Conversation Concerning the Written Conversation

Characters in order of appearance: Rebecca Skloot, author; John Casti, author; Robert Lake, Curriculum Studies professor; Patti Lather, Curriculum Studies professor; Ming Fang He, Curriculum Studies professor; Margaret Hoffen, graduate student/teacher

A pre-conference session for the fictional World Alliance of Science and Science Education Symposium is being held in the Johns Hopkins Library. The session gathers authors who have written books as conversations. Rebecca Skloot, author and science journalist, will serve as the moderator for this session. The audience is gathering to hear and be part of the upcoming discussion. Hoffen has her copy of *The Immortal Life of Henrietta Lacks* tucked safely in her bag. She is hoping for just a few moments to discuss her own work exploring Skloot's book and Henrietta Lacks.

Skloot: Welcome. It is an honor to be here with you. All of our books have something in common. As writers, we all have lots of options and lots of opinions when it comes to presenting narrative. My book, *The Immortal Life of Henrietta Lacks*, was written following "more than 1000 hours of interviews with family and friends of Henrietta Lacks, as well as with lawyers, ethicist, scientists, and journalists who've written about the Lacks family" (Skloot, 2010, p. xiii). I include places where the dialogue between

characters tells the story. I wanted to "capture the language with which each person spoke and wrote: dialogue appears in native dialects; passages from diaries and other personal writings are quoted exactly as written" (Skloot, 2010, p. xiii). Henrietta's family and other participants in the interview felt that this is a very honest way of writing. For those of you who may not be familiar with my book, I write about Henrietta Lacks's life, death, and ultimately her immortality. My biggest challenge was having to close gaps in the story. Some gaps I chose to close, others were better left open. When telling a story, "we have an obligation to each other to respect our stories and learn from these stories" (Coles, 1989, p. 30). These stories require a "teller's thoughtfulness, canniness, sensitivity and talent" (Coles, 1997, p. 93). The product that "emerges, if it is done successfully is a kind of truth...and penetrates deep within one, that leaps beyond verisimilitude or incisive portrayal, appealing and recognizable characterization, and lands on a terrain where the cognitive, the emotional, the reflective, and the moral live side-by-side" (p. 93). The books represented today are similar due to their creative formats…narrative and conversations that occur in one place and time, negating actual history or basic chronological order. We have fiction writers and nonfiction writers in this group. Let's begin by talking about the specific format you chose for your individual book. How about we start on the right and go across. For members of our audience, there will be a discussion session at the end.

John Casti: I'm John Casti. It is very nice to be here**.** In *The Cambridge Quintet*, I am "attempting to convey in a fictional setting the intellectual and cognitive issues confronting human beings involved in shaping the science and technology of their future" (Casti 1998, p. xi). By adding an element of fiction, I can "imagine how the world we

live in today was shaped by decisions of the past, and how the decisions we make today impinge upon the world of the future" (p. xii). Make sure you understand that participants in this "fictional account of the hypothetical—but possible—gathering presented here will on occasion see the participants making statements in a ways that depart from what we might imagine they would have said on the basis of their published works" (p. xii). "For the sake of exposition, I have moved several conceptual themes in AI [artificial intelligence], from their actual time in the post-1950 decades back to the period of this dinner" (p. xiii). So the work shifts certain time elements.

Skloot: John, I thought the most interesting part of your book was the setting.

Casti: The setting for my book is a fictional dinner party. It seemed like a natural choice. The chapters are divided up by dinner course. I explore "a conflict of ideas pitting Ludwig Wittgenstein and Alan Turing on opposite sides of the issue: Can a machine think?" (Casti, 1998, p. xii). In this book the ideas presented are "the message" (The Cambridge quintet: A work of scientific speculation, 1998, p. xii).

Skloot: Why not write a popular science piece? Maybe focus on today's issues, and simply use a historical backdrop.

Casti: If writing a popular science piece, "I would have been limited to what is known about the motives and thoughts of the people involved, while if a work of science fiction or a general novel had been my goal, then the story would have had to adhere to the principles and conventions of those genres, concentrating on the development and change of the world views of the book's characters through the resolution of conflicts" (Casti, 1998, p. xii). I chose science fiction. "I wanted to present a lively and comprehensible exposition

of the intellectual and emotional uncertainties involved in shaping the future of human knowledge" (p. xii). "Science fiction has a mission to try to imagine how the world we live in today was shaped by decisions of the past, and how the decisions we take today impinge upon the world of the future" (p. xii).

Skloot: Thanks, Dr. Casti. Robert Lake is next.

Robert Lake: Thanks, Rebecca. It is all about imagination for me. A professor encouraged me to write an imaginary conversation between Maxine Green and Paulo Freire. Primarily, I think dialogue "adds a humanizing dimension and makes it come to life in clear and understandable terms" (Lake, 2008, p. 113). In my work "the conversations were arranged in a way that helped me understand the role of imagination in developing my own personal agency in removing barriers to social justice, first within me, and then in the lives of those whom I teach" (p. 113).

Skloot: So you too created a fictional dialogue, bringing together people to converse about issues in today's society.

Lake: "The works of Greene and Freire epitomize two aspects of imagination: artistic and critical, that are crucial to understanding what exactly is meant by [imagination] when it is applied to the context of education" (Lake, 2008, p. 113); just as "the fusing together of film is often done in juxtaposition in ways that create greater depth and width to the representation of images" (p. 113). In my dissertation work, I was able to create "a montage of quotes form Green and Freire, in writing, that provided a way to internalize a discursive interaction between the creative and critical aspects of imagination by the blending of their written voices with my own inner voice of personal musing" (p. 113).

Writing such a dialogue is like an artist blending colors together on a palette, and then placing the individual and blended colors on a canvas. That sounds really nice doesn't it—like blending colors on a canvas. Very poetic if I say so myself. In reality writing what you think others say involves a lot of risk. I had to constantly wonder if the words I was writing for Maxine Green and Paulo Freire actually represented what they would say. I would not want to misrepresent the writer's intentions.

Skloot: Writing is definitely an art form. I personally moved back and forth between two stories in *The Immortal Life*. I had to focus on chronology: "Dates for scientific research refer to when the research was conducted" (Skloot, 2010, p. xiv). Was time or chronology a factor in your conversations?

Lake: John alluded to this earlier: Time can be flexible in this type of work. Your book, on the other hand, did involve actual scientific discoveries. It is more of a factual/nonfiction account…as much as nonfiction can be. Staying as true to actual time was necessary in your work. I bring my discussion of imagination between the two participants to modern day, to solve a modern problem.

Skloot: Thanks, Bob; let's move on to Patti Lather.

Lather: I look at your books (*waving her hand as a way of showing that "your" means the collective group*), and I must say mine appears to be very different**.** When I say different, I am speaking about the actual layout of the text on the pages. My book, *Troubling the Angels* (Lather & Smithies, 1997), has two dialogues running across the pages. I wrote *Troubling the Angels* with Chris Smithies. The book is rich in dialogue, but the dialogue is actual, and in real time. Unlike Bob's and John's, the conversations that are presented

are those of the actual participants in the women's HIV support group: "Across the bottom of much of the book is a continuously running commentary by Chris [and] I, the co-researchers, regarding our experiences in telling the women's stories that moves between autobiography and academic 'Big Talk' about research methods and theoretical frameworks" (p. xvii). Both stories are told simultaneously, similar to your account of Henrietta's story, Rebecca. Your story flips back and forth between chapters. Mine physically flips on the page. Top of the page—the women in the support group. Bottom of the page—the author's contemplations concerning the women and the horrible disease AIDS.

Skloot: Thanks so much, Patti. Ming Fang He is next. She comes to us by way of China, Canada, and Georgia Southern University.

Ming Fang He: You may not be as familiar with my work as we are all familiar with Rebecca's. She has written a very stunning best seller. Now, Bob is very familiar with my work, because I chaired his dissertation committee. I knew about Rebecca's bestseller, but now I am very well informed on her work, because another student, who is in the audience today, is very passionate about sharing the story of Henrietta Lacks with her students. This student's dissertation work is evolving from *The Immortal Life of Henrietta Lacks.* Maybe she can share a little with everyone when we have our discussion.

Lake: We have an academic family tree here—three generations. Margaret Hoffen began her work with Henrietta in my class during her first semester. Then she continued it in Ming Fang's class. Rebecca, I do hope you will have a moment to speak to her when this

session is over. She is sitting right back there. Hi Margaret (*he waves*). Sorry, Dr. He…you may continue now.

He: No problem. My life and work has put me in situations of being in-between. I write about my experiences of living between cultures. I find myself situated somewhere between East and West…as I lived and worked in China, then Canada. When I went back to China, I no longer seemed to be the same person I had been when I left. I decided to write about this when I was a doctoral student with Michael Connelly. My book, *A River Forever Flowing*, is a "cross-cultural narrative approach" that "creates new ways to think about, talk about, and write about cross-cultural lives, cross-cultural identities, and their relevance to multicultural education" (He M. F., 2003, p. xvii). I share the stories of "three Chinese women teachers as they moved back and forth between China and Canada" (pp. xvii-xviii). The teachers meet and talk. My book records the conversations. In order to protect our identities, I created composite characters, each sharing portions of each other's stories.

Maybe I could ask Margaret to interject here. She began writing conversations early in her coursework. There are ups and downs to writing conversations. You are not just writing your ideas; one has to represent the ideas of others…not just in words…but in a manner that reflects their personal beliefs, values, and even their personalities. I think it is a complex technique used to tell a story.

Hoffen: Thanks so much, Dr. He. I began experimenting a little with writing conversations. As a graduate student I was constantly reading different authors suggested by my professors. The reading was very interdisciplinary. By writing in a discussion format, these authors

could come together and converse about a topic in a way that could not happen otherwise. My first dialogue was written to highlight ideas about science and the scientific method using authors: Herman Melville, Henry David Thoreau, Ralph Waldo Emerson, Walt Whitman, and Alexander von Humboldt. I created a fictional classroom. This group of authors became the students in this fictional classroom. Their revolutionary ideas were driving one of their teachers crazy. This teacher was a very close-minded individual whose ideas represent what education should not be. The other teacher was open to the ideas of these young scholars. John Weaver suggested I read your book, Dr. Casti. With imagination—any gathering is possible. I found that adding fictional settings to the conversations added another dimension to the conversation. He asked me to write a literature review for her dissertation-writing class in a creative manner**.** I honestly thought it was a little odd to write a literature review in the form of a conversation. Once I started…it seemed to make perfect sense. I could put on paper the conversations going on in my head**.** Before long, I was on a quest to read books written in conversation. I had always been a fan of books written in interview form…such as *Conversations on Science, Culture and Time* (Serres & Latour, 1990, 1996). In this book, Bruno Latour interviews Michel Serres. The format allows for the participants' autobiography, history, culture, and relationship to science to come together. A straight narrative could not capture the multiple meanings. Fortunately, my professors continued to suggest other works dealing with conversation. Each one that I have read, amazingly, all the books you have spoken of today, has added a piece to the puzzle, as I explore how to write my dissertation inquiry.

Skloot: So Margaret, tell me how your work relates to my book.

Hoffen: *The Immortal Life of Henrietta Lacks* has become the foundation for my dissertation work. I am asking the question: Can Henrietta herself enter into conversations with scientists, science historians, science philosophers, professors, and students? Can Henrietta's story become as much a part of science as her HeLa cells? Her cells have been the object of conversations in science for many years. It was not until *The Immortal Life* that so many people actually began to include the woman behind the cells in their conversations. The story of her cells is an obvious addition to science class. But what about the woman? The real woman, who suffered and died right here at Johns Hopkins. I often wonder what kind of conversation philosophers such as Michel Serres, Donna Haraway, and Bruno Latour would have about Henrietta Lacks, or even with Henrietta Lacks. What would they think about her being part of the curriculum in science classrooms? As I form all these questions, I wonder how I can go about formulating an answer, or a response for each one. The idea came to me that conversations between selected authors could help me formulate an answer. I knew also that the answer would only come if science were allowed to intersect with literature. Weaving conversations was similar to creating art. Now it seemed everything was getting more complicated. Conversations, art, science, literature, me, Henrietta…

Lake: The best part about these conversations is that you are using your imagination. In the conversation you can bring many ideas to the discussion, with no barriers of time. I like the weaving metaphor. Where do you think your conversation will take place?

Hoffen: I honestly have not thought about that, Dr. Lake. I am thinking that at some point some of the conversation will have to occur at my school…maybe even with my students. Going back to what you said earlier Dr. Lake, I am extremely worried about making sure

I represent the ideas of each writer that I invite to the conversation. This will not be an easy task.

Lather: Margaret, I seem to understand that you are writing conversations about Henrietta and her story, and then also writing about Henrietta and your story. Don't worry, as you write, the setting and format for your conversations will come to you. You do have some wonderful examples that have been presented today. If everyone will bear with me just a moment, I want to ask our student a very necessary question. Margaret, you are enthusiastic about Henrietta's story, but so are the millions of people that read and bought the book that has occupied the best seller list for more than a few years. Don't think I am making light of your enthusiasm. Can you tell us what you hope to accomplish by telling her story? It is obvious that you want to instigate change…be specific…I want to know what kind of change can take place because you have a conversation about Henrietta Lacks.

Hoffen: That question a few semesters ago would have sent me crying, ranting, and raving into the ladies room. I have had to defend my work on multiple occasions. My dissertation committee has made sure that I have had plenty of opportunities to take on hard questions. Presenting at conferences has also helped that process. I do want to change the world. I know that in order to change the world, I must find a platform. My platform for this project is my work as a practicing striving to teach a standardized curriculum. First, I must create a space where transformation or learning can take place. Let me try to give you an example of this space using the Michel Serres "river" metaphor from his book *The Troubadour of Knowledge* to explain learning (Serres, 1991, 1997, p. 7). My students and

I are standing on a riverbank. We have to jump in the water and completely leave the shore. According to Michel Serres it is in the crossing of the river that we learn:

> In crossing the river, in delivering itself completely naked to belonging to the opposite shore, it has just learned a third thing. The other side, new customs, a new language certainly. But above all, it has just discovered learning in this blank middle that has no direction from which to find all directions. (Serres, 1991, 1997, p. 7)

I want to focus on what goes on in the middle of the river. In all honesty, we may never make it to the other side. While we are in the raging waters of this twisting, winding, raging river, we lose all sense of direction. We have no idea how to get to a specific place on the other shore.

When I share the story of Henrietta with my students, I am giving students a space where they can connect to Henrietta's story. A space where students can see that science is more than the standardized curriculum that must be taught and tested. I wonder if my students can connect to Henrietta on a personal level. I also hope they will see that they must share Henrietta's story because she cannot speak for herself. As they begin sharing her story, I want them to realize that Henrietta is not the only person in the world who no longer has a voice to bring about change. My students need to know that they use their own voices and become activists for change in our world. I want to make a comparison between Henrietta and students. The students are the nameless, voiceless faces that are being ignored in the current factory-model education system. I do not have the steps as clear as I would like. Yet, I feel like my understanding and my ability to relay this

information will evolve, as I work through the dissertation process…through writing the conversations.

Lake: You know, writing itself is a research method. I wish we had time for that discussion.

Skloot: Unfortunately, our time is up. We better stop here so everyone can get to their next session. It was nice to meet you all. I hope we can meet up and continue this conversation.

Hoffen's head is spinning. She did not know she would be part of the conversation. As she walks to the next session she has selected, she finds herself in the middle of another conversation.

Act III Scene II: Art and Science Converge

Characters in order of appearance: David Blades, professor; John Mighton, professor; Christopher Innes, professor; C.P. Snow, professor, Adele Senior, PhD candidate; Margaret Hoffen, Graduate student/teacher; and Alan Brody, professor

A small group of people are gathered in the lobby of Johns Hopkins Hospital and Research center, the meeting is being held in conjunction with an anniversary Cell-e-bration of HeLa cells—the first human cells to be grown in culture. A group of conference attendees are contemplating a display.

The display is called "HeLa." It was created by a Swiss artist, Pierre-Philippe Freymond. The display "consists of an incubator containing living HeLa cells in a nutrient medium and an inverted binocular phase contrast microscope. In addition to this scientific equipment, Freymond includes a black and white photograph of Henrietta Lacks, a light box, a neon light displaying the possessive noun Henrietta's, a mural and an A5 booklet" (Senior, 2011, p. 524). The group is

taking turns observing the cells displayed under the microscope. The room is dark. The only light is coming from the neon pink sign and the microscope's light source.

Blades: Is it art? Is it science?

Mighton: Well, if I remember from my freshman biology class…the microscope slide does sit on a stage?

Innes: Ha, a little ninth grade humor there…

Snow: I have envisioned science meeting art. This seems to be a bit of both.

A woman approaches the group, hearing pieces of the conversation.

Senior: It is BioArt—"an artistic attempt to negotiate the history of HeLa and Henrietta Lacks" (Senior, 2011, p. 514). Rebecca Skloot's approach involved "recording the life and death of Henrietta Lacks" (p. 514). Have you all read *The Immortal Life of Henrietta Lacks*?

Blades: No, but maybe this is something I need to check out. *The others were shaking their heads no.* You called this display BioArt?

Snow, Innes, Mighton all repeat the word "BioArt" simultaneously, each with their own individual puzzled look.

Senior: BioArt is the practice of using biological materials such as cells, tissues, DNA, in art work**. "**The increased use of biological material, such as HeLa cells, in art practices over the past decade has given rise to a flesh-like 'object' which is reminiscent of performances' challenge to the traditional archive" (Senior, 2011, p. 511). "Biotechnological tools and practices prompt new (and reiterate existing) challenges for a

politics of visibility and an ethics of responsibility to the other" (p. 512). "Artists working in this area utilize the tools of biotechnology and, in doing so, often include a living or biological component in their practice. Biotechnological techniques, such as tissue culture or genetic engineering, and living or biological materials such as cells, tissue, bacteria and viruses, are frequently employed as artistic media in BioArt practice. Artists and art collectives working in this field have turned to the science lab and the tools and techniques of the life sciences for a number of reasons with diverse intentions" (p. 515).

Snow: Amazing. Definitively the merging of two cultures—yet more than I ever imagined possible. Let me explain. Years ago, **"**By training I was a scientist: by vocation I was a writer…there have been plenty of days when I have spent the working hours with scientists and then gone off at night with some literary colleagues" (Snow, 1959/2013, p. 1). Long before I made a sketch, on paper, of this phenomenon I began calling it "two cultures" (p. 1).

Blades: Ah, would you happen to be the famous C.P. Snow? I think we have all probably read your lecture on the "Two Cultures" (Snow, 1959/2013, p. 1).

Snow: Yes, that would be me. Have we made advances in this area? When I gave my lecture, a decade or so ago, I insisted that "Western society is increasingly being split into two polar groups: At one pole we have the literary intellectuals, who incidentally while no one was looking took to referring to themselves as intellectuals as though there were no others" (Snow, 1959/2013, p. 4). You could describe this as intellectuals at one end of the spectrum, and scientists at the other. "Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but

most of all lack of understanding. They had a curious distorted image of each other" (pp. 4-5). The attitudes of both individuals keep them from being able to find common ground!

Are the same stereotypes I wrote about still in existence? Long ago, "nonscientists tended to think of scientists as brash and boastful…shallowly optimistic, unaware of man's condition" (Snow, 1959/2013, p. 5). On the other hand, the scientists believe that the "literary intellectuals are totally lacking in foresight, peculiarly unconcerned with their brother men, in a deep sense anti-intellectual, anxious to restrict both art and thought to the existential moment." (p. 6). My life was crazy:

> I felt I was moving among two groups—comparable in intelligence, identical in race, not grossly different in social origin, earning about the same incomes, who had almost ceased to communicate at all, who in intellectual, moral and psychological climate had so little in common that instead of going from Burlington House or South Kensington to Chelsea, one might have crossed an ocean (Snow, 1959/2013, pp. 2-3).

As a spectator in the middle, in the in-between spaces, I declared "the number 2 is a very dangerous number: That is why the dialectic is a dangerous process. Attempts to divide anything into two ought to be regarded with much suspicion" (pp. 9-10). "The clashing point of two subjects, two disciplines, and two cultures—of two galaxies, so far as that goes, ought to produce creative chances. In the history of mental activity that has been where some of the breakthroughs came" (p. 17).

Senior: The clashing of biology and art can lead to such breakthroughs. The artist considers this display a performance. "These performances work to challenge the discourse of expertise

and fear within which a discussion of these issues are ordinarily couched and encountered in the public realm" (Senior, 2011, p. 515). Without the clashing of the two supposedly historical polar entities you call "two cultures," the breakthrough is nonexistent (Snow, 1959/2013, p. 2).

Innes: So a breakthrough somewhere between biology and art—hence BioArt. "Just how rare this crossing of boundaries is, can be indicated by a glance at the historical context. In the aftermath of Hiroshima there were a number of plays from Germany that dealt with the development of the atomic bomb" (Innes, 2002, p. 20). I see similarities here. The display allows us to entertain the idea that Henrietta's life impacted the discipline of science, not just her cells, but Henrietta as a person. What is the significance of the neon sign? I know they were popular in the time that Henrietta lived.

Senior: The original display is separated from the rest of the gallery. The sign can be seen from all over the gallery, but one must come closer to observe Henrietta's photo and cells. This arrangement "reads as the transition from the public to the private world of the voyeur who secretly observes the private life of an unsuspecting other" (Senior, 2011, p. 525). The idea concerning Henrietta's cells being "removed and used without her knowledge takes on a more immediate and potentially uncomfortable resonance in an installation in which HeLa cells are magnified and Lacks's photograph is displayed alongside them in an intimate but nonetheless public exhibition" (p. 525). The artist had a very deliberate purpose in using a neon sign. "The sign initiates a nostalgic reference to an imaginary 1950's diner called Henrietta's" but its purpose is twofold (p. 525). The neon sign "inevitably attributes ownership to Lacks by employing a possessive noun" (p. 26). "What exactly is owned by Henrietta is for the spectator to decide (is it Henrietta's image,

Henrietta's cell line or Henrietta's story?)" (p. 526). The "installation instead creates a space not only to imagine a different kind of history but to imagine a different kind of archival practice"…in order to secure memory (pp. 526-527). Memory of the cells, memory of the history, and memory of the woman—Henrietta Lacks. Sorry, I did not mean to get carried away. I am a graduate student, and I get a little carried away when I have an audience willing to listen to my work.

Blades: What was your name?

Senior: Adele Senior. I have followed the rise of BioArt as a form of expression. "As the use of biological material in art practice necessarily raises ethical questions, perhaps the most ethical response is to acknowledge the otherness in which BioArt practices participate: within the acts of receiving as well as producing BioArt. Indeed, despite repeated attempts in the academy to give BioArt to disappearance, these bodily responses (bone against flesh, flesh against bone) will still remain and, like HeLa and Henrietta , will (and perhaps should) always return to haunt us" (Senior, 2011, p. 529).

Hoffen: Henrietta haunting us… now there is an idea. In Skloot's book, her family makes mention of her making her presence known from the grave.

Blades: BioArt—very interesting work. This work effectively demonstrates that efforts are being made to bridge the continuing binary of your "two cultures," Dr. Snow (Snow, 1959/2013, p. 2).

Hoffen: I heard about a new initiative for science, technology, engineering, art, and mathematics to all be taught in a connected interdisciplinary fashion. The program is called STEAM[7]. Unfortunately, because it is only offered to upper-level students, it appears that this program is only designed to further the current segregation in education. These options are reserved for the gifted and talented students. That is the part that gives me the most trouble. I think all students deserve to see how what they are learning connects to their lives. Students need their own in-between space to contemplate what they are taught and how it relates to them personally. My district is implementing STEM…not STEAM…why are the poets and artists of the world neglected? Sorry, I also tend to get carried away when I am speaking about my own graduate work. It is nice to meet you, Adele. My dissertation includes work with Henrietta Lacks. BioArt seems to be creating bridges, but in our schools I feel that your "two cultures," Dr. Snow, are alive and well (Snow, 1959/2013, p. 2). Subjects are taught according to lists of objectives. Most of these lists for science classes involve students memorizing facts on mandatory standardized tests and benchmarks. Standardization has extended the chasms separating subject matter such as science, humanities, math, and history, into isolated lists of objectives that teachers must post on their walls.

Blades: Funny you mention STEM, here. I will have a play published soon about STEM, and its impact on education. Think of it as science education meets the stage. Two of my colleagues and I performed the play at a recent conference.

[7] STEAM, stands for science, technology, engineering, art and math education.

Hoffen: Wow, I bet it was "really nice to see something other than a PowerPoint presentation" at an educational conference (Ferguson, 2014, p. 1)**.** What was the main idea behind the play**?**

Blades: "Internationally, STEM has become a slogan for organizing new discourses and practices in science education" (Weinstein, Gleason, & Blades, 2014).

Hoffen: STEM certainly is the acronym getting the most attention in the district where I teach.

Blades: Our one-act play "explores the role STEM could play in stimulating the invention, deployment, and development of alternate sources of electrical power...Through a rehearsed dialogue presented in the form of a one-act play we use the discourse of alternative power to reveal possibilities for reimagining STEM in new ways" (Weinstein, Gleason, & Blades, 2014). The dialogue on stage "demonstrates the possibility of alternative pedagogies to resist the dominating discourses of national competitiveness. Our hopeful conversation thus suggests new roles for school science education outside and against the prevailing discourse of neoliberalism" (Weinstein, Gleason, & Blades, 2014).

Hoffen: Wow, I had not thought of STEM in that way. Once a word is introduced, it finds root and no one even bothers to question what is going on. I am still a little stunned about you presenting a play at a conference. Most academic papers are not written in script form.

Mighton: I think it is very unfortunate that something like STEM is set aside for an exclusive group of students. Unfortunate indeed. Like BioArt, I think having this discourse about STEM on stage creates a place where a necessary discussion can take place. Similar to the two cultures of science.

Innes: Just in the last decade or so, a number of plays have appeared—plays which deliberately seek to reunite the "two cultures," bringing modern physics and math directly to the stage (Innes, 2002, p. 21). John, your plays have played a role in closing the gap between two cultures. Dr. Snow, John Mighton here has life experience similar to yours. He holds doctorate degrees in philosophy and mathematics. He is also a professional playwright.

Mighton: Nice to meet you all. Most of my plays do bring topics of physics and math to the stage.

Innes: Needless to say, I am a huge fan**.** These plays eliminate the deep and disastrous chasm between Dr. Snow's (1959/2013) "two cultures" (p. 2). When you see science on the stage something interesting happens:

> Humanistic values are applied to science, while at the same time scientific principles are incorporated into artistic structure. And beyond that contemporary science, whether quantum mechanics, complementarity and the uncertainty principle, or fractal geometry, thermodynamics, and chaos theory are asserted as positive forces. (Innes, 2002, p. 26)

Mighton: Most of my plays deal with mathematics and physics. I want to see individuals imagine themselves in other "possible worlds" (Mighton, 1988, p. 23). "Each of us exists in an infinite number of possible worlds. In one world I'm talking to you right now but your arm is a little to the left, in another world you're interested in that man over there with the glasses, in another you stood me up two days ago—and that's how I know your name" (p. 23). "Creatures like us that can anticipate possible futures and make contingency plans have an evolutionary advantage. We would be foolish not to use our

imaginations, not to investigate every possible fact" every nook and cranny…every in-between place (p. 26). "The possibilities swarm" (p. 61). "I also know that what you have is always relative to what you can imagine" (p. 51).

Hoffen: Umm. Use your imagination and make your presentation on stage…very un-textbook. What a great way to represent your ideas. With a stage, ideas of the past, present, and future can all meet in one place at one time, and address specific issues of the present. What about those who feel that education should be served up in nice isolated portions—all disciplines being taught as separate entities?

Mighton: Some may not know much about math and chaos theory. It is sad that "chaos has a bad name" (Mighton, 1987, p. 21). However, "All natural processes depend on [chaos]. Chaos introduces novelty" (p. 21). "The most revolutionary theories have been the most beautiful. People with scope and imagination" (p. 27).

Hoffen: Curriculum theorist William Doll (1993) uses chaos theory to talk about education. He uses a graphic called the "owl's eyes" as a metaphor to explain possibilities in education (p. 92). In popular terms, a linear system is exactly equal to the sum of its parts, whereas a non-linear system can be more than the sum of its parts. This means that in order to study and understand the behavior of a non-linear system one needs in principle to study the system as a whole and not just its parts in isolation. Education should be viewed with a similar perspective. Especially, when we start talking about linear, mono-dimensional lists of standards for teachers to teach and students to learn.

It has been said that if the universe is an elephant, then linear theory can only be used to describe the last molecule in the tail of the elephant and chaos theory must be

used to understand the rest. Or, in other words, almost all interesting real-world systems are described by non-linear systems. Novelty is what we need! I can imagine a world with Henrietta Lacks, not just her HeLa cells. I can imagine science on the stage with philosophers, historians of science, university scholars, public school teachers, students—geeks, artists, football players—all talking about Henrietta Lacks and her amazing cells. All united and knowing that there must be more than a monocular view of the worlds and its issues of social justice. I am not sure if I am thinking of a haunting here. I like Barone's use of the word "conspiracy" (Barone, 1990, p. 313). He is not using the word conspiracy to describe something "evil" or "treacherous" but defining it as a "profoundly ethical and moral undertaking" (p. 313). He goes on to say a conspiracy is "a conversation about the relationship between present and future worlds" (p. 313). I want the world to meet Henrietta up close and personal. Meet her, take a walk, converse with her. I want to hear her words, hear about her cells, her experiences, from her in person. I also want each of my students to have a voice in their own education…their own learning. Join with others to have a conversation about "present and future worlds" (Barone, 1990, p. 313). I hate to stop here but, we better hurry or we are going to be late for the next session.

Everyone leaves the exhibit hall rather abruptly. The stage darkens with only the work of art remaining lit. A lightning bolt originating in the neon sign strikes the culture dish. The culture of HeLa cells begin to bubble violently. They spill over on the table, then to the floor. Miraculously the puddle is growing into a human-like figure from the floor up. The audience only seeing a silhouette watches eagerly as the figure walks slowly to the wax statue of Henrietta Lacks on display by the entryway of the exhibit. The figure removes the clothing and shoes from

the life-size mannequin and dresses in the darkness. She steps into the light, straightens her hair, and proceeds into the lobby.

Act III Scene III: Science and the Theater

Characters in order of appearance: Margaret Hoffen, graduate student/teacher; Alan Brody, university professor of theater; small audience

The next morning, conference organizers report the theft of the mannequin's clothing to campus security and the local authorities. The artist is working to clean up the display so viewing can continue, as scientists and science educators gather to cell-e-brate the anniversary of those immortal HeLa cells and their donor, Henrietta Lacks.

Mind still spinning, Margaret sits down with her catalogue that describes the many conference sessions—the catalogue is the size of a New York City phonebook. She finds herself scanning for anything that has to do with playwriting. Is playwriting a possibility for educational theorizing? She needed more information about that play on STEM. Could she write a play about Henrietta? How would she write such a play? Could she bring science to the stage, like John Mighton? On the verge of giving up, she sees a session entitled Operation Epsilon: Science, History, and Theatrical Narrative with Alan Brody from MIT. The session begins in less than an hour. She jumps up to make her way to the room, looking puzzled as she walks by a bare figure…a bare figure that had been dressed in a very stylish suit the previous day. Wig still intact…shoes absent. What horrible person would steal the clothes off Henrietta's back? First her cells…now her clothes and shoes.

Hoffen walked into the session still bewildered by the bare mannequin. For some reason she walked right up to the front row and sat down. She glanced at the gentleman standing in the

front of the room at the podium. He smiled, and moved the podium to the wall. He pulled up a chair in front of the audience.

Brody: *Looking at Margaret Hoffen, he spoke quietly.* I think it is easier to converse with people if you sit with them…and not stand over them. *He then looked across the audience to address the group***.** Good morning. I am Alan Brody, professor of theater from MIT. My session today deals with Operation Epsilon, and the presentation of science on stage. Welcome, I look forward to our discussion. Before we launch what will hopefully be a fruitful discussion for all of us, I am going to read a brief portion of my paper:

> In 1945, shortly after VE [Victory in Europe] day, the Anglo-American forces rounded up ten renowned nuclear scientists and interned them at Farm Hall, an estate near Cambridge, England. All the rooms on the estate had been bugged. The conversations of the scientists were recorded on wax discs and translated. Information regarding both the scientists' research and anything else that might be of interest to the Anglo-American military was sent to Washington and London. The internship lasted from July to January. During that time, America dropped the atomic bomb on Hiroshima and Nagasaki, and Otto Hahn was awarded the Nobel Prize for his discovery of fission. The men's responses to those events are a part of the transcript. The entire operation had the code name Operation Epsilon: The Farm Hall Transcripts, and in the states as Hitler's Uranium Club. (Brody, 2011, p. 253)

MIT scientists and playwrights began meeting over wine and cheese to examine the history involved in these transcripts. The story of Farm Hall was my personal

> "opportunity to explore the range of possibilities in the question of the moral responsibility of scientific research. I was also aware that it would resonate, if only by implication, with another of my concerns, the question of the moral responsibility of the artist" (Brody, 2011, p. 254).
>
> "I wanted to trace the changes in these men in terms of their moral awakening (or not) about their work for Hitler. From this perspective, I could find the changes that my story would hang on. But how to tell it?" (Brody, 2011, p. 254). My goal was a telling of a story that did not disregard nor take liberties with the transcripts. "I wanted to retain historical accuracy and the immediacy of the transcripts, but I was already moving into that slippery territory of writing history theatrically, the territory where the question of limits and liberties became vexed" (p. 254).

This was all sounding too familiar to our graduate student. What had started as a simple conversation, and a retelling of a story, was evolving into a conversation involving scholars who had crossed the borders of time to meet in one place. Then composite characters were evolving to speak and tell the stories from many different places and time. Before she knew it she was writing conversations with people who had risen from the grave, people who had no voice, no choice in whether or not to be participants in my evolving story. She was speaking on behalf of scholars and university professors. What liberties can be taken? What a scary proposition, writing words for scholars she had read, and writing words for scholars she knew personally.

Brody paused to get a sip of water, and before Hoffen realized it the words just came out.

Hoffen: How do you do it? How do you weave your story? How do you set your boundaries?

People all over the room were shaking their heads in disbelief that this graduate student

had just interrupted a famous scientist and award-winning playwright, from MIT. Brody continued without even a minute display of displeasure.

Brody: Well, it is not an easy proposition, no matter what the time, no matter what the story. "Whenever it comes up, theater scholars almost automatically point to *Richard III, Mary Stuart,* or *Galileo,* implying that if it was alright for those guys it must be alright for anyone" (Brody, 2011, p. 255). "What emerged most clearly for me from those sessions about Farm Hall was the idea that the critical element has to do with whether the play, by its very structure, asks us to believe in its historical accuracy and if the intentions of the play are dependent on it. The fact that Mary Stuart and Elizabeth I never met, even though their meeting occurs in one of the great climatic scenes in nineteenth-century German theater, seems to be less problematic for most people than what Brecht does with Galileo" (p. 255).

Hoffen: She scribbles a note to herself to look up Brecht and Galileo.

Brody: "Brecht calls his play *The Life of Galileo,* with the implication that the history resonates with the present. Even with current ideas about the relativity of historical truth, there are still historical facts to be considered" (Brody, 2011, p. 255). If there is something historical that is purposely distorted, the intentions of the play may be undermined: "I am still looking for a paradigm that might locate the boundaries of license" (p. 255).

Hoffen: *She responded with another question*. How do you know how much science to include? I can only imagine conversations about nuclear fission taking place on stage and an audience all dressed up expecting only to be entertained.

Brody: I always ask myself, "How much of it did the audience need in order to follow some of the crucial questions in action?" (Brody, 2011, p. 255). "The technical issue for me was finding a way to work in enough accessible background so that the audience could follow the arguments and so that the characters did not sound as if they were simply talking science" (p. 255).

Hoffen: Is it okay to adjust the facts, so to speak?

Brody: Not everything in a play needs to be considered as truth. "We worry that verity equals verisimilitude"...we also worry that "verisimilitude implies verity" (Brody, 2011, p. 257). "That paradox opens up an opportunity for exploring the relationship between life and art, the demands of dramatic truth in the context of fact. It is a rich area of inquiry for the critic" (p. 257). I would suggest that you write in "a realistic mode and try to stay as close to the historical record" as possible. It may take quite a few performances and rewrites to obtain the balance you are looking for.

As far as she was concerned, there was no one else in the room, just she and Brody. He had transcripts; she had The Immortal Life of Henrietta Lacks *and several other tellings of Henrietta's story. Because of Rebecca Skloot, people knew Henrietta's story, but did people know the implications of her story in philosophy, history of science, university classrooms, and high school science classrooms? If the story unfolded on stage, students could witness this firsthand. All participants could create a version of Henrietta's story involving his or her perspective; his or her life experience.*

Postscript: How to write a play

When I look back on the beginning scenes that I wrote and compare them to the scenes in Chapter three, I need you to understand that their origins are quite different. Scenes written from Act I and Act II were loosely based on actual conversations. Writing these scenes involved a simple recounting of events. Act III was composed through academic and imaginative efforts. As I mentioned earlier, I was encouraged to write a "creative" literature review for my dissertation inquiry class. When I approached Dr. Weaver about this possibility, he suggested I read John Casti's (1990) book, *The Cambridge Quintet* (Casti, 1998). He also suggested I read Patti Lather and Chris Smithies' book *Troubling the Angels* (1997). I began reading these works and went back to my bookshelf and pulled other works written as conversations. I liked how the conversations flowed together. I wondered if I could pose a question and have several authors respond. Once I started thinking about writing in the form of a conversation, my entire writing process changed. I had always recorded notes in margins and notes in black and white composition notebooks. These notes matched up chronologically as I read, page by page, book by book. When I began the process of writing a conversation, I started by posing a question for the participants of a particular chapter to discuss. I recorded my questions at the top of a page in my notebook. Then I would read an author and record quotes that related to the answer to the question. I would do this for all the authors in a particular batch of works. In the early part of this work, I would type in my quotes and print them. I would use scissors to cut the quotes into strips and then piece the conversation together on my dining room table. Once I formed the academic layer of the conversation, I began composing and weaving the imaginary layer of the play—the setting, the interruptions, the basic parts of the conversation that told the logistics of the meeting,

and made the necessary connections to Henrietta Lacks. As I continued to read and study, I would make additions to the conversation.

I was challenged by the act of writing dialogue for people who I only knew through their books, sitting on my bookshelf. I emailed the authors of these works and asked them if they had read *The Immortal Life of Henrietta Lacks*. I explained my project and asked them if they had planned to write about Henrietta Lacks. Then I asked if they felt that sharing the story of Henrietta Lacks was important. Once I read their own words, it was much simpler to create their character in the script. I want to emphasize that writing the fill-in dialogue was the most difficult part of writing the play. I have much anxiety about misinterpreting someone's work by writing something that they would not say or even think. Writing dialogue for people that you do not know is extremely difficult, however, writing dialogue for people that you know, mainly professors from my program, is a terrifying endeavor. Although I understand this play is a work of fiction, I chose to let the professors and authors keep their real names. It is my hope that I have not misrepresented anyone's thoughts or ideas.

CHAPTER FOUR

ENTER HENRIETTA LACKS

No Stranger to Johns Hopkins

Henrietta Lacks was no stranger to Johns Hopkins Hospital/Research Center. Henrietta Lacks underwent a biopsy on February 1, 1951, at Johns Hopkins. Henrietta's physician, Howard Jones, read her chart before her examination. The chart described her as a "housewife and mother of five" with only a "sixth or seventh grade education" (Skloot, 2010, p. 16). She experienced breathing difficulties and anxiety concerning her "oldest daughter who is epileptic and can't talk" (p. 16). Henrietta reported to the doctor that her household was happy; she was an occasional drinker and not an extensive traveler. The doctor found her to be "well-nourished and cooperative" (p. 16). The chart noted issues with bleeding during her last two pregnancies, "increased cellular activity in the cervix" and a positive gonorrhea test (p. 16). With each of these problems, Henrietta declined treatment. After the biopsy, Howard Jones sent Henrietta home following her procedure and dictated notes about her visit and her diagnosis. Jones found it "interesting that she had a term delivery here at this hospital, September 19, 1950. No note is made in the history at that time, or at the six weeks return visit that there is any abnormality of the cervix" (p. 17). Before her biopsy procedure, the chief resident allowed George Gey to obtain a sample before radium was put in place to treat the very "shiny and purple (like grape Jell-O)" cancerous tumor (p.17). Jones (1971) reported that the "carcinoma of the cervix was the first to be grown in culture…was biologically unique…and resistant to radium treatment" (Jones, McKusick, Harper, & Wuu, 1971, p. 947). Henrietta died eight months later on October 4, 1951, at Johns Hopkins.

George Gey died of pancreatic cancer in 1970. During a tribute to George Gey, the source of HeLa cells is finally revealed to the public in an article written by Howard Jones and his colleagues (Jones, McKusick, Harper, & Wuu, 1971). Jones was the attending physician who diagnosed and prescribed Henrietta's treatment at Johns Hopkins. These colleagues ask a very important question: "Will she live forever if nurtured by the hands of future workers?" (Jones, McKusick, Harper, & Wuu, 1971, p. 947). Howard Jones noted that, "even now Henrietta Lacks, first as Henrietta, then as HeLa, has a combined life of 51 years" (p. 947). Using his method of calculation, today HeLa cells have a combined life of 95 years. Those amazing cells have made quite a name for themselves, but Henrietta and her family did not seem to be connected to the cells until the McKusick, Harper, & Wuu (1971) article. Jones combines the age of Henrietta with the age of HeLa cells when it appears scientists doing research with HeLa cells kept the two separate. As a medical doctor who had met Henrietta, Jones may have felt more of a connection to Henrietta. Imagine being a research scientist and your vials of HeLa cells arrive at the lab. Would you feel a connection to the source of the cells? My biology students view human cheek cells, and to their amazement, seeing cells that make up their body helps them feel connected to information taught about cells.

Leigh Van Valen, an evolutionary biologist at the University of Chicago, proposed that HeLa cells in laboratories today are evolving separately from humans, and having a separate evolution is really what a species is all about (Van Valen, 1991). Van Valen (1991) and her group propose that because HeLa cells have been in laboratories and not part of a complete organism they have acquired different characteristics over time. She proposes classifying them as a new species of cells for several reasons, including that it's "way of life has no resemblance to that of, say, mammals" (Van Valen, 1991, p. 73). Robert Stevenson spent most of his career

working with HeLa cells and the issue of contamination in laboratories. His view of HeLa cells and their genetic makeup is different from Van Valen's. In an interview, he told Rebecca Skloot (2010):

> Scientists don't like to think of HeLa cells as being little bits of Henrietta because it's much easier to do science when you disassociate your materials from the people they come from. But if you could get a sample from Henrietta's body today and do DNA fingerprinting on it, her DNA would match the DNA in HeLa cells. (p. 216)

I do not believe that we can think about HeLa cells separate from Henrietta's cells. The source of the cells has to be acknowledged. With the Human Genome project, DNA is becoming exactly who we are. At some point in time, we may all carry around our personal genome on a computer chip or SIM card. Our genome is not just a unique sequence of nitrogen bases; our genome is who we are.

In the spring of 2013, the "European Molecular Biology Laboratory in Heidelberg, Germany" posts a portion of the HeLa cell genome on the Internet. Here we go again…without the Lacks consent (Callaway, 2013). "Imagine if someone secretly sent samples of your DNA to one of many companies that promise to tell you what your genes say about you. That report would list the good news (you'll probably live to be 100) and the not-so-good news (you'll most likely develop Alzheimer's, bipolar disorder and maybe alcoholism)" (Skloot, 2013, p. 2). Why does this matter? Let's take it one step further: Once your genome has been analyzed, the results are added to an international database for all to see. Instantly a new venue for discrimination has been invented. "Genetic information can be stigmatizing, and while it is illegal for employers or health insurance providers to discriminate based on that information, this is not true for life

insurance, disability coverage or long term care" (p. 2). Henrietta's HeLa cell genome was posted on the internet without consent. Rebecca Skloot spoke to the great-granddaughter of Henrietta Lacks, Jeri Lacks-Whye. Lacks-Whye stated, "That is private family information, it shouldn't have been published without our consent" (p. 2). Following the release, a scientist "uploaded HeLa's genome to the public website called SNPedia, a Wikipedia-like site for translating genetic information. Minutes later, it produced a report full of personal information about Henrietta Lacks and her family" (p. 2). The scientist only shared the information with Rebecca Skloot. The European team that posted the gene sequence took it down after hearing from the Lacks family. Only 15 people had downloaded the information. The team has hopes of talking "with the Lacks family to determine how to handle the HeLa genome while working toward creating international standards for handling these issues" (p. 4). "The publication of the HeLa genome without consent isn't an example of a few researchers making a mistake. The whole system allowed it. Everyone involved followed standard practices. They presented their research at conferences and in a peer-reviewed journal. No one raised questions about consent" (p. 2).

"The Lackses' experiences over the last 60 years foretold nearly every major ethical issue raised by research on human tissues and genetic material" (p. 2). Think about these issues for a moment. The first and most obvious is that Henrietta Lacks could only get treatment at Johns Hopkins Hospital in a public ward. Secondly, it was common practice among doctors to use patients in the public ward as research material "usually without their knowledge" (Skloot, 2010, p. 29). It was 1957 before the words "informed consent" would make it to a courtroom (p. 132). "Now they're raising a new round of ethical questions for science: though their consent is

not (yet) required for publishing private genetic information from HeLa, should it be? Should we require consent before anyone's genome is sequenced and published?" (Skloot, 2013, p. 3).

The story of Henrietta Lacks and her family began over 60 years ago. Through understanding the story, and viewing the story through a series of different lenses, the story might prove to be valuable in solving current issues concerning scientific and medical ethics. When will Henrietta become a person deserving of basic human rights? Can Henrietta's story help shape the course of science? What if we all become judged or categorized based on the sequences of our nitrogen bases? What if you are treated as if you are bipolar, because someone sees that possibility reported on some website or database listing your personal genome? Scientists and writers telling the story of HeLa cells often personified characteristics of HeLa cells onto Henrietta herself. The language itself brings additional issues of racism and sexism into the story. The commodification of HeLa cells further complicates the story. Where does ownership stop and start? I can't help but think it is important to contemplate the connections between Henrietta and her HeLa cells for the sake of her family, and for the sake of science.

Act IV Scenes I and II will involve several characters traveling to The World Alliance of Science and Science Education Symposium at Johns Hopkins Hospital/Research Center and the opening session of this conference. The first begins with stories of how conference participants journey to Johns Hopkins Hospital/Research Center. As they make their journey, they experience mysterious encounters that are all connected to the story of Henrietta Lacks. The overarching theme of this imaginary meeting involves celebrating the anniversary of HeLa cells. Once the participants arrive, they attend a keynote address. Roland Pattillo will be introducing the session. Dr. Pattillo is a professor from the Morehouse School of Medicine. Dr. Pattillo worked in George Gey's laboratory where HeLa cells were originally grown. He was one of the first scientists who

set out to tell Henrietta's story. Priscilla Wald, Hannah Landecker, and Rebecca Skloot make up the panel presenting the keynote address. All of these individuals have been passionate about the story of Henrietta Lacks. The foundation for other conversations that take place in the following two chapters will be provided in the keynote address. The conversations will allow views to be shared and compared. A resurrected Henrietta Lacks will try to gain access to their conversations. Not all members of the panel choose to acknowledge the voice of Henrietta as she tries to share her story and convince the panelists that she and her family should be part of science.

Act IV Scene I: Traveling to World Alliance of Science and Science Education

Characters in order of appearance: John Weaver, professor; Cootie Lacks, Henrietta's cousin; Peter Appelbaum, professor; and Nancy Cartwright, physicist.

Travelers make their way to the World Alliance of Science and Science Education Symposium. Today is February 7, 2016. John Weaver finds himself out in the middle of nowhere. He is speaking aloud to himself.

John Weaver: I always get lost when I get in too big of a hurry. The flat tire was a bonus. This place is way past the middle of nowhere. That GPS wench has let me down for the last time…

An old gentleman taking a leisurely walk approaches Weaver. He looks at him closely.

Cootie Lacks*:* Are you one of those Johns Hopkins doctors…here to ask about Henrietta's cells?

Weaver: I am a doctor, but not that kind. I am John Weaver. I am a professor. I seem to have taken a wrong turn off the interstate. I have a flat tire…no cell phone service. This rental car has no spare.

Cootie Lacks: We do not get many of your kind in these parts. (*The old man chuckled*)…No one ends up here unless Hennie makes it happen. Evidently, we are supposed to be having this conversation right now. This is one for the record book: Hennie haunts professor's GPS…Mm mmm mmm. You know, Hennie stopped a reporter from coming to talk to us. He had a wreck. Then she caught his house on fire and burned up all the notes from his interview. I got a cousin who can come help you with your tire. My house is right over there…let's say we adjourn to the porch while we wait. I can tell you her story. That is the only reason people end up in these parts. She is buried right down the road. Real nice guy from Atlanta bought her and her little girl Elsie their own headstones, years after they died.

Weaver: When you say Hennie, do you mean Henrietta Lacks? *Weaver had shared this book with his students. One of his students in particular was very interested in using Rebecca Skloot's book,* The Immortal Life of Henrietta Lacks, *in her classroom. He was in shock…His bookshelf was coming to life in the middle of nowhere—complete with a flat tire. Weaver, although agitated, realized he had stumbled into an amazing opportunity. He knew that his best bet was to relax…be in this moment…listening to this story first hand, and not upset Henrietta. It was only a flat tire. He had read about Henrietta controlling life from the grave. He may have been the only traveler to cross Cootie's path in many, many years. The old gentleman was talking nonstop.*

Cootie Lacks: Of course, but we all called her Hennie. The railroad tracks back there mark the division between the black Lacks families and the white Lacks families. Henrietta's grandfather was white. Her mother was a slave. They farmed these parts together, and then eventually became landowners.

Weaver: What can you tell me about Johns Hopkins and those immortal cells?

Cootie Lacks: I will get there…You gotta listen…unless you is walkin…it kinda looks like to me that you ain't got no better place to go.

Weaver: I cannot argue with that. Lead the way. I am listening! You got any cold Mountain Dew…the kind with real sugar? (*Cootie threw his head back and laughed.*)

Cootie Lacks: Don't you worry any. I will take good care of my new doctor friend. Henrietta would not have it any other way.

Evening of February 7, 2016—welcome to World Alliance of Science and Science Education Symposium reception being held in the hospital lobby.

Peter Appelbaum: Hi John, I am glad you made it. I got a short distress text from you…the only word on the screen was flat…I figured if you needed me, you would have sent more info.

Weaver: I would have sent some more info if my phone had not died. Honestly, Peter, I expected more of you. Maybe a squadron of search helicopters, a full-scale ground operation.

Appelbaum: (*Chuckles.*) You remember David Blades and Nancy Cartwright. I am glad that you have already had an epic adventure just getting to the conference. Maybe after the reception we can all grab a drink and you can tell us all about it. We have not seen Patti yet. I know she is coming. Maybe we should send out a search party for Patti.

Weaver: I met the most interesting man. He thought I was a doctor from Johns Hopkins Hospital coming to ask questions about Henrietta Lacks.

Appelbaum: Henrietta? Isn't she the woman those cells came from—the reason the meeting is at Johns Hopkins this year? She was a patient here at Hopkins, right?

Weaver: This old guy tried to convince me that this Henrietta had risen from her grave to make sure I had ended up in Pleasantville. The guy wove a great story, and had a refrigerator of cool drinks. I rate it as one of the best detours I ever took.

David Blades: I did not know about Henrietta or her cells until your graduate student sent me an email about her dissertation. (*He stopped abruptly and snapped his fingers.*) I met her today. It was dark…We were all standing around and talking about a HeLa exhibit. She was talking about Henrietta Lacks. That had to be her. She had some questions about my STEM play. The group had a very interesting discussion going on around a BioArt exhibit.

Nancy Cartwright: You are serving on her committee right? She wanted to know if I thought Henrietta Lacks should be part of science curriculum. John, it is priceless that you ended up in Henrietta's town talking to Henrietta's family, while serving on a dissertation committee for a student writing about Henrietta Lacks. *Nancy begins to hum the Twilight Zone theme.* It is experiences such as your detour that make our "dappled world, a world rich in different things, with different natures, behaving in different ways" (Cartwright, 1999, p. 1). Better watch out. Henrietta might have a hold on you…from the grave. *The group laughs.*

Weaver: To a dappled world!

The four raise their glasses in a toast.

Act IV Scene II: Meeting Day

Characters in order of appearance: Bruno Latour, philosopher of science; Michel Serres, philosopher of science; Donna Haraway, philosopher of science; young child about 5 years old; young child about 3 years old; Father; Patti Lather, university professor; Henrietta Lacks

A group of professors are making their way to a meeting at Johns Hopkins University. They all have an encounter with the story of Henrietta Lacks at some point in their journey.

Today, February 8, 2016, was no different than any for Bruno Latour. It did not matter where he was; his routine was always the same. He spent the first part of each day carefully examining his morning papers. Today he carefully analyzed three papers: *The Baltimore Sun*, The USA Today—kindly provided by the hotel staff, and The New York Times. Bruno Latour gathers his newspapers and examines their contents in a way that will make a concrete sequential reader's head spin. Latour jumps from an idea on one page to an idea on a previous page in a back and forth fashion to show how the headlines in no way reveal a cohesive story. During this morning's exploration, Bruno first read an article about a lawsuit being settled in Massachusetts, granting a family the right to deny researchers access to their mother's cells. On page three, he reads the most recent Best Seller list and notes that *The Immortal Life of Henrietta Lacks* has remained on this list for over three years. He sees that a scientist, Hans Jörg Rheinberger, is currently in town to present a paper on how RNA translation takes place. The next headline read: "Experimental science not all it is cracked up to be"? Hmm, thought Latour to himself…"That is a low blow to current close minded educational policy makers…school science is monopolized by learning a simple experimental method. Unbeknownst to him, the connection to the best seller and the ownership of cells will become part of his day. He heads downstairs to the hotel restaurant for one more cup of coffee with his longtime friend and colleague Michel Serres.

It is very unusual for Michel Serres to agree to any public event. He decides to make this trip due to the encouragement of Bruno Latour. He was on faculty at Johns Hopkins, years ago. He and Latour share a common interest in science. The pair collaborated on a book several years prior to this event. His session will allow him to discuss the importance of philosophy, history, culture in science, and connections to humanities and literature. This is a rare opportunity at a research institution such as Johns Hopkins, where traditions are strong in strict scientific methods. Serres' life was formed by science, a science unrecognizable in today's world of high gloss, high-priced science ventures.

The same morning, coming from the west end of town, Sandra Harding enters the Johns Hopkins Hospital lobby. The lobby is serving as an exhibition hall for publishers and other displays filled with glitzy projects like personal genetics and personal medicine. The large company Moneysanto is giving away computer tablets as well as food samples, composed of genetically modified organisms they produce, to all educators in attendance. A large group of pharmaceutical companies is filling the halls with promises that their medications improve test scores. There is even a booth advertising Teacher Robots. Now I have seen it all, Sandra thinks to herself. Over in the corner, away from the fanfare, she sees a tattered display cabinet, obviously part of the actual lobby, with pictures of a basement laboratory. The caption reads: "It was here that George Gey and his assistant Mary Kubicek were able to grow the first human cells outside the human body." There were pictures of HeLa cells being packaged and sent all over the world. A small model of George Gey's drum roller was in the case. Seeking solitude away from the center ring of this circus, Harding begins to read the text posted on the back of the display cabinet. George Gey, a man who never patented his famous drum roller, or sold HeLa cells, was at the center of a huge controversy involving the taking of tumor cells following a

woman's surgery. The woman was a wife and mother of five, just thirty years old. The controversy included a huge cover-up. Although she is intrigued, Sandra glances at her watch and decides she'd better hurry to her meeting room.

Donna Haraway is also making her way to Johns Hopkins Hospital through the Baltimore morning rush hour traffic. Science teachers and leaders in science education were coming from all over the world to attend this conference. Donna, a university professor, had arrived the evening before. The hotel shuttle dropped her off across the street from the hospital entrance. The driver gave her directions to the conference building. She decided to sit on the bench under the giant oak and enjoy her coffee before starting her day. As she closed her eyes, she sighed…she had slept restlessly in the hotel the previous night. Honestly, she had expectations of this being just another long-winded session of people disconnected from humanity, women, science, and classrooms, giving lofty advice. Sitting on the bench with her eyes closed just resting for a moment, she heard a small child's voice:

Child*:* Daddy, when we goin up to see Mama?

Father: Child, she is right there in the window…can you wave at her? She is too sick to come down and too sick for you to go up. This is as close as we can go…

She opened her eyes, expecting to see a child and her father, but there was no one. Maybe they had walked quietly past. She stood up and looked at the wall of windows. She could not see anyone waving. She chuckled…It was probably a dream…me all the way in Baltimore…no worries, nothing to do for a whole thirty minutes…I probably had myself a nap and did not know it. She decided to sit back down at this lovely place. Eyes closed again…she refused to be nervous about the upcoming meeting.

Child: Daddy, Make little Deborah stop cryin…maybe you need to change her diaper or hold and rock her like mama does."

Father: I will pick her up, Lawrence. Can both of you look way up there? See Mama, she is looking out that window to see you.

This time Haraway knew she was not asleep…she jumped up and whirled around…no one was there. The leaves–dull and brown, lacking their vibrant fall colors—were rattling as a cool winter breeze filled the air. The breeze gave her a chill. Okay, I need to move on, she decided. She crossed the street and entered the hospital lobby, looking for a very strong cup of coffee.

Patti Lather's cab arrives outside of Johns Hopkins Hospital at 8:30 am. Her meeting was on the fourth floor at 9:00 am. I can make it, she thought. Her flight had been delayed overnight, and there were no polite words for the bustling Baltimore traffic. She hurries through the entrance of the Johns Hopkins Hospital lobby. A historical display of photographs catches her eye. In the pictures, she notes the colored rest room and a large sign pointing to the colored ward. Then she notices a group of old photographs of a beautiful African-American woman…hands on hips…bright red lipstick. The caption under the picture revealed that her name was Henrietta Lacks. Completely distracted from the original goal of making her 9:00 meeting on time, Patti stopped, pulled her tablet from her bag, and Googled the name: Henrietta Lacks. She clicked on the first article and began reading: Her name was Henrietta Lacks but the world knew her as HeLa. Patti had studied HeLa cells in a college biology class…but she had never even questioned their origin. Why not? Now it seemed like a missed opportunity to have not asked more questions in her science classes. The second link was about a book…she sat

down in the lobby and began to read an excerpt. She looked up from the device and saw a beautiful African-American woman come through the revolving door wearing a stylish brown suit. A bone-chilling breeze blew through the lobby. The woman stopped at the information desk.

Henrietta Lacks: Can I get directions to the public ward?

Receptionist: (*She did not hear Henrietta's question. Everyone had been asking the same question, so she repeated her answer*): The presentation hall. Go straight and take the elevator on the right up to the fourth floor.

Another cold chill ran through Patti's body as she looked up from her device again and looked toward the information desk. This was 2016—there are no public wards in hospitals. She blinked and decided she'd better make her way upstairs. There was not time to question the receptionist…but she would be back later.

Act IV Scene III: Opening Session

Characters in order of appearance: Roland Pattillo, professor of medicine; Patricia Wald, professor of literature; Rebecca Skloot, author; Hannah Landecker, professor of biology; Henrietta Lacks; Patti Lather, professor of Curriculum Studies; John Weaver, professor of Curriculum Studies; Donna Haraway, philosopher of science.

By 9:00, all four scholars were sitting quietly in the auditorium, waiting on the keynote address to begin. There was not much small talk in the auditorium. Each individual seemed very perplexed…even quiet…considering how scholars usually behave at academic meetings. As others filed into the auditorium, three women walk quietly up the stairs to the stage. The women take their places in chairs on the right side of the podium. Each adjusts her microphone, each

situates her water glass. Oddly enough all three are wearing an article of red clothing. Roland Pattillo makes his way to the podium from the other side of the stage.

Roland Pattillo: Good morning. It is my honor to be here to welcome you to this year's meeting of The World Alliance of Science and Science Education. This year we are not only gathering for discussion of science and science education, we come to honor the anniversary of the HeLa cell line. In recognizing the importance of this cell line, we also wish to pay homage to the woman, Henrietta Lacks, who served as the source or donor of these cells. This tremendous story will open up many opportunities for discourse. The theme of this year's meeting is very significant to me personally. As a young "postdoctoral fellow in [George] Gey's lab," I found myself immediately connected to Henrietta Lacks (Skloot, 2010, p. 219). Science can tell the story of the cell and the cell lines, but I found myself compelled to tell her personal story.

You will not be hearing a lot of statistics and empirical data concerning HeLa cells today. We are here to celebrate the woman behind the cells—the stories of the woman and the cells. We hope that when you continue your discussions in the breakout sessions later, you will find the conversation centering on Henrietta and her HeLa cells, not simply the latter.

Our keynote speakers will be sharing a tremendous story with you today. A story that includes racism, economics, and what it actually means to be a human amidst all the new advances in biotechnology. It is my honor to introduce them. First on my left, we have Priscilla Wald. Dr. Wald currently teaches at Duke University. She "teaches and works on U.S. literature and culture, particularly literature of the late-18th to mid-20th

centuries, contemporary narratives of science and medicine, science fiction literature and film, and environmental studies" (Duke University, 2015). Wald's "work focuses on the intersections among the law, literature, science, and medicine" (Duke University, 2015). She has written about Henrietta and Henrietta's HeLa cells. Her current interests involve tackling issues brought about by the Human Genome project.

Next, we have Hannah Landecker. Dr. Landecker is currently the acting director of the Institute for Society and Genetics at UCLA. She "uses the tools of history and social science to study contemporary developments in the life sciences, and their historical taproots in the twentieth century" (UCLA Institution for Society and Genetics, 2015). Hannah "has taught and researched in the fields of history of science, anthropology and sociology [focusing] on the social and historical study of biotechnology and life science, from 1900 to now" (UCLA Institution for Society and Genetics, 2015). She authored a book called *Culturing Life: How Cells Became Technologie*s (2007). For those of you interested in a detailed historical account of how HeLa cells became the first human cell line, I recommend it highly.

Finally, we have Rebecca Skloot. In academia, we would all be lying if we said we have not all wanted to accomplish what this science journalist has accomplished. She has brought the story of Henrietta Lacks to the masses. A story that forever changes anyone that hears. Change does not happen because the story of Henrietta Lacks is so unique. Unfortunately, there are many similar stories; change is possible because the story is written in a way in which we can connect to the woman behind the cells. What will change when you meet Henrietta and her family? Will it be one's willingness to connect to the world around them? If you have not heard of Rebecca's book, it might be

because you stay holed up in your laboratories…working hard...isolated from the world around you. We as researchers must do diligent work and keep long hours, but we must not neglect to keep up with the needs of the changing world around us. The *Immortal Life of Henrietta Lacks* began selling in January of 2010. The novel has spent over two years on the New York Times Best Seller List (Best Sellers, 2013). Skloot spent 10 years unearthing the story of Henrietta Lacks, the woman behind the amazing HeLa cells, and the first human tissue culture line for medical research. (*Pattillo takes out a copy of* The Immortal Life of Henrietta Lacks *from under the podium.*) Ms. Skloot, I guess I can call you Rebecca, Rebecca opens her book with a quote from Elie Wiesel, writer of *The Nazi Doctors and the Nuremberg Code* that I would like to share with you. I think it sums up our collective purpose here today very well: "We must not see any person as an abstraction. Instead, we must see in every person a universe with its own secrets, with its own treasures, with its own sources of anguish, and with some measure of triumph" (Wiesel, 1992, p. ix). Skloot's passion was to unearth Henrietta's story and put a name and face with the story of HeLa cells. All three women who share the stage with me today share the mission of telling the story of Henrietta Lacks. Ladies, I turn the microphones over to you.

Priscilla Wald: I like the quote, Rebecca—what a great quote to open your book and get to the heart of the matter. Dr. Pattillo, I think that is a great way to focus our conversations today. No one should be an abstraction. "This a global story, and is also a biotechnological story, which is to say that it entails the development of laboratory techniques and associated business interests that involve the production, use, and

marketing of living organisms" (Wald, 2012a, p. 185). It is an honor to be with all of you here today.

Skloot: I want to thank you personally, Dr. Pattillo, "for taking time to figure me out, for believing in me, for schooling me and for helping me contact Deborah Lacks" (Skloot, 2010, p. 339). You and your wife opened up your home and even served an editorial role for *The Immortal Life of Henrietta Lacks.* (*She looks across to the other members of the panel.*) I agree it is an honor to be here today, under the same roof where it all happened. The three of us got together yesterday when we all arrived in Baltimore to discuss our presentation. We did not want to duplicate each other's efforts. We each hope to tell a different portion of the story. I will apologize for any overlaps up front. We each bring a different perspective to this story, but we share a common purpose: This story needs to be shared, not only to honor Henrietta Lacks and her family, but the application of this story to current-day issues in science and science education might help us identify specific areas that need resolution. We thought it would be helpful if you heard the history of the HeLa cell line first. Then we can get into the issues that came about from the creation of the cell line. We are not going to be very formal about our speaking. We will all interrupt and interject when we feel necessary. Hannah, why don't you get this story started.

Hannah Landecker: Good afternoon. For those who have been holed up in their laboratories and are unfamiliar with this story, I am going to offer a very brief summary. George Gey began his work trying to grow cells outside the human body, right here at Johns Hopkins Hospital/Research Center some 60 years ago, down in the basement. He was specifically committed to the project of growing "cervical cancer cells in the hope that their life under glass would reveal something about their action in the body" (Landecker, 2000, p. 57).

Gey was looking for a cure for cervical cancer. He felt that if he could study cells outside the body, he could find the answer. In February of 1951, "A piece of cancerous cervical tissue was cut from a woman named Henrietta Lacks" (Landecker, 2000, p. 53). Lacks died on October 4, 1951. "Without her knowledge or permission, Lacks became part of the cervical cancer research project when a piece of the biopsy material was sent to the Gey laboratory" (p. 53). Mary Kubicek, George Gey's laboratory technician, had been working for two years to grow cells in culture. Each sample of "live cells [from the biopsies] were grown in test tubes, supplied with nutrient medium and kept at body temperature in an incubator" (p. 53). This was the beginning of the first human cell line, the HeLa cell line. The cell line was named by taking the first two letters from the patient's first name and the first two letters from the patient's last name, HeLa, in the case of Henrietta Lacks. Although for years the donor's identity was kept a secret…HeLa was thought to stand for possibly Helen Lane, or Helen Larson. "Researchers realized that this cell line would do what others would not—continue to grow and divide, quickly and copiously" (p. 128). "George Gey never attempted to patent, or otherwise limit the distribution of HeLa cells, clearly not anticipating the chain letter effect of sending out cultures which were grown up, split into parts, and sent on to others" (p. 57). The story has two endings: "the cells live and the woman does not" (p. 53).

As Henrietta's family is moving on and living a life without her and without knowledge of her immortal cells—life is good in the tissue culture world…for the moment. "HeLa cells were being mass-produced as part of a push for the rapid evaluation of the polio vaccine, which Jonas Salk developed in 1952" (Landecker, 2000, p. 57). "The Tuskegee Institute, a historically black college in Alabama, was appointed by the

National Foundation for Infantile Paralysis to be the locus of production" of HeLa cells (pp. 57-58). The use of Henrietta's cells became widespread, and the line "began to stand in for a generalized human or cellular subject...a factor in this flourishing of research was the availability of living human materials for experiments that could or should not be performed on living persons" (Landecker, 2007, p. 165). "The ubiquity of HeLa continued, but its invisibility as 'standard reference cell' faltered in 1967 with the announcement that HeLa cells had contaminated and overgrown many of the other immortal human cell cultures established in the 1950's and 1960's" (p. 168).

Skloot: I would not have wanted to be Stanley Gartler on that day at the "Second Decennial Review Conference on Cell Tissue and Organ Culture" (Skloot, 2010, p. 152); I imagine the setting would be similar to what you are experiencing today. An audience filled with scholars and cell biologists. "There in front of George Gey and the other giants of cell culture, Gartler announced that he'd found a 'technical problem' in their field" (p. 152). Gartler informed the audience "all those years researchers thought they were creating a library of human tissues, they'd probably just been growing and re-growing HeLa" (p. 154).

Landecker: Gartler tested 18 different cell lines for a group of enzymes that differ very slightly between people. "All 18 had the same profile as the HeLa cell. The key piece of evidence in this study was the profile for a particular enzyme called G6PD (glucose-6-phosphate dehydrogenase), which is a factor in red blood cell metabolism" (Landecker, 2007, p. 168). Gartler told the audience, "I have not been able to ascertain the supposed racial origin of all 18 lines; it is known, however, that at least some of these are from Caucasians, and that at least one, HeLa, is from a Negro" (Gartler, 1967, p. 173).

Wald: It is the accounts of this technical problem that bring to light the complicated issues surrounding the HeLa cell line. Gartler contacted George Gey and explained the problem. He believed that cross contamination had occurred in laboratories where new cell lines were being established. Some of the cell lines had a specific protein marker. “Racial identification of the donor of the HeLa cells became important when Gartler sought to identify the extent of the contamination of other cell lines” (Wald, 2012b, p. 250). Remember, HeLa cells were the first cells to grow outside the body. Now it is “the very properties that had allowed the cells to survive in the Petri dish in 1951 also posed a serious problem for medical researchers. The remarkable aggressiveness of the HeLa cells made them very difficult to contain, and they contaminated other cell lines, in some cases invalidating years of research (p. 250).” Gartler had to know the race of the donor. Why, you may ask?

> The donor’s racial identification was relevant to Garlter for tracking the cells: it had no bearing on their aggressiveness. The anthropomorphism of the cells shows both how the race and gender of the donor permeated the public narrative and how cultural biases surface when scientific research yields new entities. (Wald, 2012b, p. 250)

Landecker: We have to begin wondering where Henrietta begins and ends in reference to HeLa cells. When listening to descriptions of HeLa cells, “HeLa cells have been continually personified in the image of their origin, Henrietta Lacks” but these personifications change as time passes and the story evolves (Landecker, 1999, p. 212). In the beginning when HeLa cells were depicted “as a miracle of modern science and part of the triumph over polio, HeLa was personified with the image of a beneficent young Baltimore house

wife" (p. 212). Most of this personification grew out of how science was writing about HeLa cells. The narrative written and published in medical textbooks and professional journals with "Lacks's photograph side by side with photographs of HeLa cells in culture in locations such as medical textbooks and professional journals. These narratives were then taken up with enthusiasm by journalists" (p. 212)

In 1967 when Gartler made his announcement concerning HeLa contamination, we see Henrietta personified in a different way. Gartler, a geneticist, addressed the group of molecular biologists by saying, "HeLa cells originally came from a 'black' donor, and produced a protein from a gene allele that he said was specific to the 'black population'" (Landecker, 1999, p. 213). If this protein specific to Henrietta's HeLa cells was found in a cell line from a white person, scientists used the word contamination. The language used continued to digress, "with this announcement, the personification of HeLa changed instantly to that of Henrietta Lacks as a promiscuous, malicious black woman" (p. 213). "Unlike the writers in the 1950's, these authors were not interested in the figure of the self-sacrificing house wife" (Landecker, 2007, p. 171). HeLa cells were now described as having an "identifiable biological race due to their particular genetic structure as black, female, "vigorous," "aggressive," "surreptitious," "a monster among the Pyrex," indefatigable," "undeflatable," "renegade," catastrophic," and "luxuriant" (p. 171). The narrative of reproduction out of control was linked with promiscuity through references to the cells' wild tendencies and their "colorful laboratory life" (p. 171).

Around 1980, we see another shift in descriptions of HeLa cells, "when the perception of an economic value for cell lines refocused attention on the circumstances of the cell line's origin in a biopsy for which informed consent was neither asked nor given"

(Landecker, 1999, p. 172). Now the current issue dealt with laws of consent and questions of ownership. HeLa cells "should have had a dollar value from the beginning, because look what they would be worth today, after all these years the investment account that is the burgeoning biotechnology industry" (p. 172). HeLa cells are still being sold today. Rebecca, do you know the current dollar amount for a vial of HeLa cells?

Skloot: "Invitrogen sells HeLa products that cost anywhere from $100 to nearly $10,000 per vial" (Skloot, 2010, p. 194). What is most interesting to me in this discussion of profits is the number of individuals who have profited because of HeLa cells. You should all take a minute on your computer and search the "U.S. Patent and Trademark Office database" for patents related to HeLa cells (p.194).

Members of the audience begin to reach for their tablets; Dr. Pattillo on the stage hits send on his search.

Skloot: What did you get, Dr. Pattillo?

Pattillo: "More than 17,000 patents involving HeLa cells" (Skloot, 2010, p. 194)**.**

Wald: Amazing! Prior to 1974, Henrietta's family does not even know that HeLa cells exist. "Many have profited from the HeLa cell line, [but] Lacks's family has not shared in any of the profit" (Wald, 2012b, p. 247). Many familiar with the case, including medical ethicists and Lacks's family, have a perception of wrongdoing on the part of the medical establishment. Throughout the history of this story, the medical establishment here at Johns' Hopkins has been questioned concerning wrongdoing. Discussions of the story center on "the racism evident in the treatment of Lacks and her family and the narratives

that circulated when the identity of the door of the HeLa cells became public knowledge. It is, however difficult to pinpoint the exact nature of the violation" (p. 247).

Skloot: "Spokespeople for Johns Hopkins, including at least one past university president, have issued statements to me and other journalists over the years saying that Hopkins never made a cent off HeLa cells since George Gey gave them away for free" (Skloot, 2010, p. 194).

Wald: The case of Henrietta Lacks did not have much precedence. It was commonplace for scientists to take tissue samples without consent forms in those days. The family struggled, while medical science and pharmaceutical companies were able to profit from the prolific cell line. If the cells had been patented shortly after they began growing in laboratories, history may have been different. "Unlike subsequent researchers who patented cell lines, the Geys did not get rich from the HeLa cell line" (Wald, 2012b, p. 248).

Skloot: I don't think George Gey was ever in the business of growing cells for profit. He did not patent his "roller-tube culturing technique" (Skloot, 2010, p. 39). Without this invention, cells would not have grown in culture.

Wald: The issue of patents and profit are secondary to the issues of racism present in this story. Henrietta died in a segregated ward. Her cells were taken without permission and "used to develop drugs and other treatments to which many of her decedents might not have access" (Wald, 2012b, p. 248). I don't think it makes any sense to "argue that Lacks should not have been on a segregated ward because her cells were unique or that her family should have access to better health care because of the properties of Lacks's cells"

(p. 248). What the story of Henrietta Lacks shows us is "the institutional racism that has plagued the nation since its inception. Lacks should not have been on that public ward because that public ward should have never existed" (p. 248). With that said, don't you think that she and her descendants should have access to better health care because such access ought to be a fundamental human right and not a privilege?" (p. 248).

Skloot: Considering racial issues, economic issues, power, and privilege, I think the last part of this story we must discuss has to be bioethics. Let's go back in time to 1947, when "a U.S.-led tribunal in Nuremberg, Germany, had sentenced seven Nazi doctors to death by hanging. Their crime was conducting unthinkable research on Jews without consent: sewing siblings together to create Siamese twins, dissecting people alive to study organ function" (Skloot, 2010, p. 131). The Nuremberg Code, a code of ethics with 10 specific points, was written to provide guidelines to supervise all human experimentation throughout the world. "The first line in the code says, 'the voluntary consent of the human subject is absolutely essential'" (p. 131). Asking for consent was a revolutionary idea. "The Hippocratic Oath, written in the fourth century BC, did not require patient consent. And though the American Medical Association had issued rules protecting laboratory animals in 1910, no such rules existed for humans until Nuremberg" (p. 131). "The term 'informed consent' first appeared in court documents in 1957… decades before anyone thought to ask whether informed consent should apply in cases like Henrietta's where scientists conduct research on tissues no longer attached to a person's body" (p. 132).

Henrietta's family came into this entanglement in 1974. A researcher at Johns Hopkins called Day Lacks, Henrietta's husband, and asked him to gather all the children

at his home so they could come and draw blood. The researchers, Victor McKusick and Susan Hsu, were only hoping to test for specific HLA markers that could be used to identify Henrietta's HeLa cells in the laboratory. There was a huge language barrier between Day Lacks and Hsu, the Chinese research fellow. When the researcher called, Lacks thought that they were coming to the house to draw blood to test the children for cancer. He called all of the children to meet with the researchers the next day. No attempt was made to obtain informed consent. Deborah, Henrietta's daughter, "now almost 24, not much younger than Henrietta had been when she died. It made sense they were calling saying it was time for her to get tested" (Skloot, 2010, p. 184). Deborah had been preoccupied with her mother dying of cancer at age 30. She suspected that she would die of cancer when she was 30 as well. She kept calling, asking for the results of the cancer test. "She would not stop worrying. She was terrified that she might have cancer, and consumed with the idea that researcher had done—and were perhaps still doing—horrible things to her mother. She'd heard the stories about Hopkins snatching black people for research, and she'd read an article in *Jet* about the Tuskegee study that suggested doctors might have actually injected those men with syphilis in order to study them. Deborah began studying, asking questions. I was with Deborah the first time she saw her mother's cells. Deborah worked hard to learn about her mother's cells and her mother's cancer. Let me read you an excerpt from Deborah's journal. (She focuses on her notes)

> Going on with pain
>
> …we should know what's goin on with her cells from all of them that have her cells. You might want to ask why so long with this news, well it's been out for years in and out of video's, papers, books, magazines, radio, TV, all over the

> world….I was in shock. Ask, and [no one] answers me. I was brought up to be quiet, no talking, just listen….I have something to talk about now, Henrietta Lacks what went out of control, how my mother went through all that pain all by herself with those cold hearted doctors. Oh, how my father, said, how they cooked her alive with radiation treatments. What went on in her mind all those months, not getting better and slipping away from her family? You see I am trying to relive that day in my mind. Youngest baby in the hospital with TB, oldest daughter in another hospital, and three others at home, and husband got to, you hear me, got to work through it all to make sure he can feed his babies. And wife dying…Her in that cold looking ward at [John Hopkins] Hospital, the side for Blacks only, oh yes, I know. When that day came, and my mother died, she was robbed of her cells, and John Hopkins Hospital learned of those cells and kept it to themselves, and gave them to who they wanted and even changed the name to HeLa cell and kept if from us for 20+ years. They say Donated. No No No Robbed Self. My father have not signed any papers…I want them to show me proof. Where are they? (Skloot, 2010, p. 195)

As Skloot reads, the door in the back of the auditorium squeaks open. An African-American woman in a brown suit slips into the shadow and takes a seat on the back row.

Henrietta Lacks: Did my precious Deborah write that?

Skloot: Excuse me, did someone have a question? (*She looked around, and squints trying to see where the voice came from.*) I think Deborah's writing sums up the issues this story brings to the table: racism, economics, class, power, and ethics.

Landecker: The connection between Henrietta and her immortal cells is where this story starts to get interesting. Some think of the two as interchangeable. “They somehow stand for her and she for them: otherwise this situation would not present itself as a paradox, much less one that has generated such fascinated attention from 1951 to today” (Landecker, 2000, p. 53). “Cell lines are made to stand in for persons in the first place: They function in the laboratory as proxy theaters for intact living bodies” (p. 54). HeLa cells can function in the following capacities:

> Sites of manufacturing of viruses or proteins or antibodies—cell lines are the tools of the industry whose product is human health. Their identification as “living” and “human” entities cannot fall from them, because it is this origin that gives them commercial and scientific value as producers of biological substances for use by humans and their validity as research sites of human biology. (Landecker, 2000, p. 54)

Skloot: It is easy to view stories as a having a beginning, middle, and successful conclusion. We can be caught up in all the good stuff…without seeing the entire story. Some people never get pass this shortened version: That HeLa cells have been “bought, sold, packaged, and shipped by the trillions to laboratories around the world**”** (Skloot, 2010, p. 2). HeLa cells “went up in the first space missions to see what would happen to human cells in zero gravity” and were crucial in “developing the polio vaccine, chemotherapy, cloning, gene mapping and in vitro fertilization” (Skloot, 2010, p. 2). We hope as you move into the rest of your discussions, that issues of race, economics, and what it means to be human when dealing with cell lines will make it into your conversation. What does

Science have to gain from including Henrietta in this narrative? Can Henrietta Lacks herself become the center of this narrative, for science, for education, for humanity?

The keynote session ends and everyone begins to depart to their assigned session rooms.

Patti Lather: *(turns to John Weaver)* Did you see the woman sitting on the back row?

Weaver: Which one?

Lather: She had on a brown suit, sandals—a very pretty woman. I saw her in the main lobby this morning. She asked where the public ward was this morning. I will be at our session in just a moment. I need to run downstairs first.

Weaver: Are you sure she said public ward? That is odd, there has not been a public ward here for years. Hopkins established the hospital to help the poor. In his will he set aside money specifically to help Black orphans. But I am not sure his ideals were upheld. My new friend Cootie Lacks told me that Hopkins's relationship with the Black community in Baltimore was not good. Cootie reported that the doctors were using children for experiments. He also said that people were afraid to go out at night because doctors from Hopkins might grab them and take them away to their laboratories.

Donna Haraway: Cootie Lacks? (*Haraway gives Weaver a very puzzled look.*)

Weaver: It is a long story; I got a flat tire on the way to Baltimore and met a member of Henrietta's family. Just a chance meeting. He helped me get my tire fixed, and gave me a cold Mountain Dew. We sat on his porch and talked. Mostly about Henrietta. I better get moving, I need to get the room set up for my session.

Haraway: I thought my trip was strange. Patti, I saw the woman you are talking about. She looks a lot like Henrietta. Maybe she is a relative.

Lather: I am going to see if the receptionist remembers her.

They exit the stage, the lights go dark.

Postscript: Encounters with Henrietta

In the process of creating a conspiracy and seeking avenues for change in education, I have chosen to cross the boundaries of simple narrative. First, I employed conversations, then narrative, storytelling, and playwriting, and now science fiction. Why is an element of science fiction needed in this dissertation? If I were just telling the story of Henrietta Lacks, or just chronicling my life as an educator, there would be no need…no purpose. Retelling stories can provide a time of reflection, but the idea is to create a conspiracy to open up new ways of thinking in order to change education. Science fiction "provides a genre, a medium through which the future can be speculatively visualized in the present" (Weaver, Anijar, & Daspit, 2004, p. 1). From an educational point of view, "science fiction can also open up students'/teachers' minds to previously unforeseen possibilities while concurrently empowering people to become curricular creators and co-creators as well as theorists" (p. 1). Science fiction allows us to travel a path in which "we are freed to take flight, soaring away from the present course of essentializing educational practices, proletarianizing policies, commodification, exploitation, and objectification…while seizing (imaginative) power to influence the way in which education is visualized in the present" (p. 3). Why create a scene in which Henrietta comes to life from a beaker of cells? You were probably fine with the conversations taking place, but did you really take in the idea that, in between sessions at an imaginary conference, Henrietta herself is

resurrected? A spark from a glowing sign and a puddle of spilt HeLa cells…creating a full-grown life-size version of Henrietta, who repossesses her own clothes from a wax mannequin standing in an exhibit hall. (I choose the word repossesses to describe how Henrietta gets her own clothes. If I had said steal, I would be personifying Henrietta in a negative way.) Deborah, Henrietta's daughter, resisted the idea of a museum when Henrietta's identity was first made known and the first foundation for the Lacks family was proposed: "the family don't need no museum, and they definitely don't need a wax Henrietta," she said. "If anybody collecting money for anything, it should be Henrietta children collecting money for going to the doctor" (p. 223).

The scholars have all encountered Henrietta Lacks in some way during their travel to the meeting at Johns Hopkins. Their interest has been sparked by something that took place outside the meeting itself. Each has listened to individuals who are passionate about telling the story of Henrietta Lacks. They are ready to discuss the story of Henrietta along with the story of the amazing HeLa cells. As you begin to hear the story and learn about Henrietta and her cells, I must offer some words of advice. Make sure you are open to the whole story. You may want to forget everything you know about Henrietta Lacks up to this point and start fresh. My fear is that people who hear the story may only be remembering aspects of the story such as HeLa cells went to the moon, or that they can "wrap around the earth at least 3 times, spanning more than 350 million feet" (p. 2). The purpose of sharing this story is not to simply bring recognition and glory to our cell donor, Henrietta Lacks. The purpose of telling the story is to examine the story and see how it can be applied to the problems we find in current-day science education.

CHAPTER FIVE

CONSPIRACY TO INTERRUPT PHILOSOPHY AND HISTORY OF SCIENCE

Not Just HeLa, Henrietta Lacks

Rebecca Skloot begins her prologue in *The Immortal Life of Henrietta Lacks* by describing a photo that hangs on her wall of a woman she has never met. "She looks straight into the camera and smiles, hands on hips, dress suit neatly pressed, lips painted deep red…oblivious to the tumor growing inside her—a tumor that would leave her five children motherless and change the future of medicine" (Skloot, 2010, p. 1).

In the beginning, it was only researchers who were having issues of contamination with their cell lines that needed or wanted to know Henrietta's story. Stanley Gartler made this announcement concerning Henrietta's identity and race at a scientific conference on "cell tissue and organ culture in 1966" (Wald, 2012b, p. 247). Once Henrietta's identity was released, many became very interested in her story. Michael Rogers (1976), Michael Gold, (1986), Octavia Butler (1987), Hannah Landecker (1999, 2007), and Phoebe Wesel (2004) all published "public narratives about Lacks that put assumptions about race, sex, and gender conspicuously on display" (p. 247). In addition to these major publications, The British Broadcast Company (BBC) made a documentary called "The Way of All Flesh" directed by Adam Curtis (1997). It was not until Rebecca Skloot published *The Immortal Life of Henrietta Lacks* that Henrietta gained attention made possible via a *New York Times* bestseller. Now that everyone is reading about Henrietta Lacks, one must ask how this text, with such a history, will affect the teaching of science. Can Henrietta's voice be heard in such a conversation?

In the following scene, Henrietta Lacks works to make her way into a conversation concerning science, philosophy, history, society, culture, and education. The conversation takes place between Michel Serres, Bruno Latour, Hans Jörg Rheinberger, Donna Haraway, Sandra Harding, and Hannah Landecker. The group has just attended the opening session for the World Alliance of Science and Science Education. They make their way to a conference room a short distance from the main auditorium. There is a large overlap in this group of individuals. Some might call them philosophers of science. Others consider them historians of science. Some might say they study the culture of science. Placing these individuals in a concise category is not the purpose of the conversation that needs to take place. The individuals all bring a unique point of view to a discourse involving what science really is and what science should mean to all participants in society, including Henrietta Lacks. The individuals will openly discuss how they view science. Their conversation will allow their views to be shared and compared, as Henrietta Lacks tries to gain access. Not all members of the panel choose to acknowledge the voice of Henrietta as she tries to share her story and convince the panelists that she and her family should be part of science. Can Henrietta become part of this discussion about science and science education involving philosophy, history, culture, society, and science?

Act V: The Conversation Continues

Characters in order of appearance Hans Jorg Rheinberger, historian of science; Donna Haraway, philosopher of science; Sandra Harding, philosopher of science; Bruno Latour, philosopher of science; Michel Serres, philosopher of science; Henrietta Lacks

Donna Haraway, Bruno Latour, Sandra Harding, and Michel Serres leave the large auditorium and make their way to a smaller meeting room down the hallway. A man with keys arrives and opens the door, welcoming the group to enter. Everyone takes his or her place around

the table. The audience begins to arrive in small groups. A graduate student makes her way to the front row. She holds in her hands a stack of books. Members of the panel recognize them as their own works. The one on top is orange…*The Immortal Life of Henrietta Lacks*. This text has been the heart of the discussion so far.

Hans Jörg Rheinberger: Good morning, it is great to see all of you here. I am honored to be sitting at a table with all of you. Thank you Dr. Serres for making this unprecedented appearance. I understand this is a homecoming of sorts for you and Dr. Haraway, both having worked as part of the faculty here at Johns Hopkins. I am most honored to be included as part of this panel. I guess I can begin the introductions. I am Hans Jörg Rheinberger. Feel free to call me Hans. My areas of specialty include philosophy of the biological sciences…to also include "the history and philosophy of science, in fields ranging from anthropology, sociology, and economics, to literary studies" (Rheinberger, 2010, p. xi). As a scientist and science teacher, I come to you with a rich background in basic scientific experimentation. That might be easier to recognize, had I not checked my lab coat at the front desk. *(The members of the panel chuckle, knowing the stereotypical scientists, working in only laboratories, wearing lab coats, have been long gone—although that was the precedent.)* Hannah Landecker will be joining us shortly. She can help guide the conversation concerning HeLa cells and Henrietta. I know all of your work, but I think you should offer a brief synopsis for our audience members.

Donna Haraway: Introductions can be cumbersome. We can learn about introductions by considering how other species behave. For an example, take baboons: "Among baboons, both friends and nonfriends greet one another all the time, and who they are is in constant becoming in these rituals. Greeting rituals are flexible and dynamic, rearranging pace

elements within the repertoire that the partners already share or can cobble together" (Haraway D. J., 2007, p. 26).

Baboons and dogs seem so much more truthful, honest, and genuine when it comes to greeting rituals. "This sort of truth or honesty is not some trope-free fantastic kind of natural authenticity that only animals can have while humans are defined by the happy fault of lying denotatively and knowing it" (Haraway D. J., 2007, p. 27). I have a tremendous amount of respect for organisms of different species. Please do not reduce what I am saying here to: humans cannot be honest and your dog cannot lie. We know that our primate relatives carry out "tactical deception" in nature (Dunbar, 2004, p. 44). My focus is that we as humans can learn from the honest communication that we witness in other species. Thus "the truth telling is about co-constitutive-natural cultural dancing, holding in esteem, and regard open to those who look back reciprocally" (Haraway D. J., 2007, p. 27).

I am Donna Haraway. In my book *Simians, Cyborgs and Women*, I describe myself as a "proper, U.S. socialist, feminist, white feminist hominid biologist, who became a historian of science to write about modern western accounts of monkeys, apes, and women" (Haraway, 1991, p. 1). I am currently exploring "technoscience and the relationships of science to history, culture, and living beings" (Haraway, 1997, p. 25). All of this sounds rather grand and glorious, but honestly, I simply want to be part of the science that can prepare us to live in the 21st century. I have written for years about the treatment of women in science and looking at science with a feminist perspective. I keep thinking about Skloot's remarks about Deborah Lacks. *Haraway sighed deeply.* Deborah and I have something in common. We both lost our mothers at an early age. We both

thought we would die of the same disease, at the same age, as our mothers. I was convinced "that I would die when she died, at forty-two of a heart attack, that my body was her body" (Haraway, 2000, p. 14), just as Deborah thought she would die of her mother's cancer. Being preoccupied with dying of cancer is not very logical. In Deborah's case, Henrietta died from a tumor brought about by being exposed to human papillomavirus. And this morning I hear the voices of children about to lose their mother. (*This last comment catches the group by surprise. They look at Donna puzzled. Sandra Harding speaks up quickly, to refocus the group's attention on the required topic of the day.*)

Sandra Harding: Donna, I am so sorry you lost your mother at such a young age. Loss is difficult at any age, but I would think the difficulty would be magnified, even exponential for a young person. (*She looks around hoping it is okay to proceed with her own introduction.*) For those of you who do not know me, I am Sandra Harding. I will also be bringing a feminist point of view to the table today. I want to make a case for what I call "strong objectivity" (Harding, 1991, p. 142). Let me take a moment and explain this. When looking through feminist lenses, objectivity is more stringent than most epistemologies. The feminist "standpoint epistemologies call for recognition of a historical or sociological or cultural relativism—but not for a judgmental or epistemological relativism" (p. 142). This is a "call for the acknowledgement that all human beliefs—including our best scientific beliefs—are socially situated, but they also require a critical evaluation to determine which social situations tend to generate the most objective knowledge claims" (p. 142). The standpoint epistemologies are very different from judgmental relativism—since judgmental relativism does not require "a scientific

account of the relationships between historically located belief and maximally objective belief. So they demand what I shall call strong objectivity in contrast to the weak objectivity of objectivism and its mirror-linked twin, judgmental relativism" (p. 142).

When we hear the story of Henrietta Lacks, the story is very human. All of our lives have been touched by cancer. In all honesty, all of our lives have been touched by HeLa cells…do you remember getting your polio vaccine? I ask: Should science be completely objective? I have found that the manner in which objectivism is translated by most will only result in what I call a "semi-science" because it "turns away from the task of critically identifying all those broad, historical social desires, interests, and values that have shaped the agendas, contents and results of the sciences much as they shape the rest of human affairs" (Harding, 1991, p. 143).

Haraway: I have studied this as well. "The natural sciences are legitimately subject to criticisms on the level of 'values,' not just 'facts'" (Haraway, 1989, p. 13). Work in natural sciences "are subject to cultural and political evaluation 'internally' not just 'externally'…implicated, bound, full of interests and stakes, part of the field of practices that make meanings for real people accounting for situated lives" (p. 13). Scientific observations are not exempt from this process.

Harding: Exactly! We cannot bypass, or sweep under the rug, or wish away what is going wrong in science or our world as a whole. We must be encasing ourselves with a true strong objectivity. "The sciences need to legitimate within scientific research as part of practicing science, critical examination of historical values and interests that may be so shared within the scientific community" (Harding, 1991, pp. 146-147). The study of

sciences cannot be so segregated by the individual disciplines that "cultural bias" is created "between experimenters or between research communities" (p. 147). Dr. Latour, you are next.

Bruno Latour: I am Bruno Latour. I guess you might call me a French anthropologist, sociologist, and philosopher. I do not find labeling very useful because most categories negate overlaps, pluralities, and endless possibilities. I find that the current categories and boundaries we use in science and science education may be the source of our problems in these fields. We need to become aware that "all of culture and all of nature get churned up again every day" (Latour, 1991, 1993, p. 2). I cannot simply read a newspaper each day without noting this phenomenon. I find it disturbing that the stories are presented and seem to say, "let us not mix up knowledge, interest, justice and power…heaven and earth, the global stage and the local scene, the human and the nonhuman" (p. 3). (*He motions to the gentleman sitting next to him, as if to say next.*)

Michel Serres: Most of you know that I prefer a "solitary exercise of philosophy" (Serres and Latour, 1990, 1996, p. 2). I hope I can bring perspective to issues being discussed today that you find foreign—a perspective that is relevant for science of the 21st century. Up to this very moment my work "consisted of preparing for the moment when we would pay the true price of the consequences of science's takeover of all reason, culture, and morality" (p. 86). Science is constantly taking over. If you would like some examples, may I offer Hiroshima and the Holocaust? I have witnessed the attempts of science taking over the world through first-hand experience in the streets of France, where I grew up. Science must have some system of checks and balance. I think philosophy and history can provide this.

Henrietta Lacks: (*sitting on the back row in the shadows*) I have witnessed this takeover of science as well, Dr. Serres. Dr. Rheinberger is not going to introduce me. Why would he? I only have a 6th grade education. I was a wife and mother of five children. I entered the world of white coats downstairs through the same lobby that you entered this morning. However, my Johns Hopkins Hospital was complete with a "colored" bathroom, a "colored" water fountain, and segregated public wards (Skloot, 2010, p. 13). I was just a woman in the colored ward dying of cervical cancer. "I [was] invisible; understand simply because people refuse to see me" (Ellison, 1995, p. 3). To science, I was HeLa—nameless, faceless—just HeLa, not Henrietta.

(*Haraway makes eye contact with the woman speaking on the back row. Her body jolted, she closed her eyes, shook her head, and turned to listen to Rheinberger, in hopes of trying to make sense of what was going on with her mind and her eyes this morning.*)

Rheinberger: Our objective today is to examine current science and science education practices and contemplate the entire HeLa story. Considering the company, I have a feeling…our discussion will become multidimensional and interdisciplinary! A little history, a little philosophy…Let us get started. Can I get a volunteer to begin our discussion?

Lacks: This is not just a HeLa story, it is my story too.

Haraway: I would feel better not calling it the HeLa story.

Latour: I will start. I have been ready to go since early this morning. I got here in time to view the HeLa cell art exhibit downstairs. The hall was locked up. Evidently, part of the exhibit was vandalized during the night. I hope they have the exhibit opened later. I find HeLa cells very interesting. I like Sandra's idea that with the separation of fields in

science that bias can be created. Would you not say that this type of separation occurs when science is taught in isolation in classrooms? Without the curriculum itself having personal relevance to us, the students of science, and the world that we live in, science has no meaning. How could so many have taught about those miraculous cells without a mere mention of their source? I hope to learn more when I view the HeLa exhibit.

Lacks: (*Henrietta rolls her eyes.*) There he goes again. HeLa…Why won't he use my name? Why won't they say, "Henrietta's cells"? They are my cells, right? They came from my body. Those infamous cells…Call me a "Pyrex monster" (Landecker, 2007, p. 171).

Latour: Science has social implications as well, not all positive. Science education has to be more than those standardized tests. I was happy to see in a recent newspaper that parents in the Chicago school district are "opting their kids out of standardized testing" (Wallace, 2015). I tell you that this needs to happen everywhere. I heard that in some districts students are not even participating in the basic science fair projects.

Rheinberger: I always thought those science fair projects were a little narrow minded…Maybe narrow minded is not a good word. Let me try this…I think the standardized structure gives students an idea that all science comes about in nice neat steps…but in lieu of standardization, projects would be better than students completing giant stacks of test practice worksheets. Why is it that people always attach the idea of a strict experiment to science?

Harding: There are so many more possibilities that could come to life in science class. There is a teacher presenting later today. Did you see it on the program? She uses the story of Henrietta Lacks and HeLa cells to teach high school biology. Her abstract says the

students respond to the story by writing songs, poetry, art, and letters to Henrietta herself or to her family members.

Lacks: Finally, someone said Henrietta's story.

Rheinberger: I wonder if she lets them look at HeLa cells under a microscope. In science class, one would not expect to hear about poetry and art. Science class is usually dominated by the strict scientific method. I have always found it interesting that "the experimental system is the smallest functional unit of science" and yet it gets the most press (Rheinberger, 1992, p. 306). This small unit is "designed to give answers to questions which we are not yet able clearly to ask. It is a machine for making the future" (p. 309). The experimental unit "is not only a device that generates answers: at the same time and as a prerequisite, it shapes the questions that are going to be answered…a device to materialize questions" (p. 309). This process of experimentation is not unlike "any particular autobiographical narrative" (p. 310). What some may not realize is that these small experimental data units are much more than one would think. These units connected may indeed tell a story.

I would personally like to see science consider experimental systems and move in a direction where the "kind of movement in which reasoning makes itself by way of tracing" (Rheinberger, 1992, p. 306). Tracing is a natural progression in which the pathway is not predetermined. Actions are determined based on need, not a prescribed, predetermined method. The scientist moves about the information unrehearsed, unscripted. One might call it laboratory improvisation. We could make a reality show…sorry for my digression from the formal conversation this morning. Let's think

about Paul Feyerabend's work for a moment (1975/2010). He tells us that "theories become clear and 'reasonable' only after incoherent parts of them have been used for a long time. Such unreasonable, nonsensical, unmethodical foreplay thus turns out to be an unavoidable precondition of clarity and empirical success" (Feyerabend, 1975/2010, p. 11). In this somewhat "concrete, practical process of the search for knowledge, explicit methodological rules are rather counterproductive, only causing additional confusion where they are supposed to produce clarity" (Rheinberger, 2010, p. 63). Feyerabend (1975/2010) "felt that the history of science after all does not just consist of facts and conclusions drawn from facts. It also contains ideas, interpretations of facts, problems created by conflicting interpretations, mistakes and so on" (p. 3).

I will continue by saying that:

> Instead of speaking about theories, experiments, instruments, and their connection in order to characterize scientific enterprise … I speak about the experimental situation, about scientific objects or 'epistemic things,' the differential reproduction of experimental systems, and the conjuncture of each system. (Rheinberger, 1992, p. 307)

This teacher you mentioned, if she is having students learn about HeLa cells from the story of Henrietta Lacks, is she tracing the history of cell lines? With all the implications of this story, tracing the history would allow the students to consider so much more than a basic experiment.

Harding: There has to be a tracing of some sort…think about the knowledge generated from scientific research. Once an experiment has ended and the data is collected, new

knowledge produced, students are taught that the process is repeated, so the new knowledge can be confirmed. Real science we know does not end with simple knowledge production. There will be consequences to accompany the new knowledge. Consequences that affect society. Consequences that should be analyzed before, during, and after experimenting. This analysis should be very detailed and multidimensional. Without this detailed analysis, scientists are practicing what I call "weak objectivity" (Harding, 1991, p. 147). Weak objectivity creates a situation where "scientists produce claims that will be regarded as objectively valid without their having to examine critically their own historical commitments, from which—intentionally or not—they construct their scientific research" (p. 147). Allowing the practice of weak objectivity in science "permits scientists and science institutions to be unconcerned with the origins of consequences of their problematics and practices, or with the social values and interests that these practices support" (p. 147).

Lacks: Hmm…Weak objectivity. Does this mean that scientists think that my children being able to go to school and tell the other children that their mom's cells "wrap around the earth at least three times, spanning more than 350 million feet" is pretty cool? I would not mind that. I do not mind them sharing that my cells helped millions of people…but there is more to the story. Science should take care of people in need. I would say there are cases where the title human experimentation hides human exploitation. When my battle with cervical cancer began, Johns Hopkins was the only hospital where I could go for treatment. Richard Wesley TeLinde was one of the top cervical cancer experts in the country; he justified the use of the innocent for the advancement of science…for the good of all humanity. Howard Jones, my doctor, wrote, "Hopkins, with its large indigent black

population, had no dearth of clinical material" (Skloot, 2010, p. 30). Students of science need to know the circumstances that landed my cells on the moon. Then maybe they will ask questions like: Did the doctors give Henrietta the same dosage of radium that any other woman would have received? Was Henrietta being treated for her cancer, or was she just another experiment, making payment for her debt…her room and board in the public ward?

Haraway: Room and board in the public ward (*she repeated under her breath*), while her children looked up at her window from the park below. Excuse me Hans, Did you hear that? (*She looks around, shakes her head, and reaches for her coffee. Was the voice she heard a member of the audience?*) Please excuse me for interrupting. (*She scanned the meeting hall looking for a face that might have matched the voice. The voice seemed to be coming from the shadowy back row*.)

Rheinberger: No problem. I did not hear anything. All of these systems are related to the "practical process of producing knowledge" (Rheinberger, 1992, p. 307). I do not want to deny that the experiment is not important to research—it may actually serve as the foundation of research. However, it is only one component, "the smallest functional unit of research" (p. 309). If we start a list as we go, we can keep up with what we think science and science education need to mean to students of science…at all levels. Can we all agree that working in laboratories to create knowledge is important? I think we have covered that the strict method is not necessary, but the basic process of inquiry should be taught and understood by everyone. (*Rheinberger writes* "*Basic laboratory skills of inquiry/not-strict method*" *beside number one on his notes.)*

Harding: I agree Hans; it is the experimenting that produces what the world considers science or scientific knowledge.

> Science has been held in such a high regard since Sputnik, of course—indeed , ever since Newton—but the flood of industrial and federal funds that pours into scientific and technological projects in universities these days is truly astounding. It is a long time since scientific research could be regarded as significantly isolated in real life from the goals of the state and industry—if it ever could. Scientific research is an important part of the economic base of modern Western societies. (Harding, 1991, p. 4)

Lacks: (*Louder this time from the back row.*) I hear from your conversation that you have a high regard for the process of experimenting. Do you and your students of science understand the implications of using humans for experimentation without their consent? Have you all forgotten about the Tuskegee syphilis experiment? How about all the people that died at the Crownsville Hospital? What about the prisoners that were injected with my cancerous HeLa cells?

Haraway: No, I have not forgotten about Tuskegee. Yes (*speaking to address the woman on the back row*), I do understand the implications of humans being exploited. I am appalled that those researchers withheld treatment. Those men died horrible, painful deaths. (*She stands and speaks in Henrietta's direction, then realizes she has interrupted again. It is obvious she is the only one who can see the woman on the back row, much less hear her. She sits down quickly.*)

Harding: Donna, I was talking about the economic connection to science. Not exploitation, I think. Did I say exploitation instead of economics?

Haraway: We have someone on the back row who wants to join in on the conversation. I was responding to her. The woman on the back row, she is wearing a brown suit. She mentioned the Tuskegee syphilis experiment. She also mentioned the Crownsville Hospital. I am not sure I know about the Crownsville hospital.

Rheinberger: I think you are both are right. Economics of science can lead to exploitation in science. Go back to 1951 in this very hospital. The public wards were full of individuals who were not able to afford health insurance. Many individuals because of their race could not even gain admittance to hospitals…they might have just "died in the parking lot" (Skloot, 2010, p. 15). Yesterday, in the exhibit downstairs, I read that Johns Hopkins Hospital was one of the only hospitals that allowed African-Americans to be admitted to the hospital's public wards.

Haraway: Henrietta, right? Did you have children? Deborah was the baby?

Lacks: Yes, I had five children, before I was 30. My youngest son, Joseph, was born right here in this hospital. Deborah was 3 when I died.

Haraway: Wow, five! When I was much younger, with my Catholic upbringing, "I figured I'd have 10 children" (Haraway, 2000, p. 10). (*Donna chuckles, and then realizes she is getting loud. Harding thinks she is asking a question and jumps in to answer it.*)

Harding: She was a mother of five, just 30 years old when George Gey took her cells. I read about it in a display case downstairs this morning.

Latour: (*Using his tablet to read from the conference program.*) It says here that Crownsville was a hospital for the Negro insane. There is an excerpt posted from Rebecca Skloot's book, *The Immortal Life of Henrietta Lacks*. You can find it in the back of the program catalogue, in its own appendix. A representative for the hospital told Skloot and Deborah that, "there wasn't much funding for treating blacks in the forties and fifties…and Crownsville wasn't a very nice place to be back then" (Skloot, 2010, p. 270). The two were visiting to retrieve medical records for Elsie, Henrietta's daughter who died at Crownsville.

Lacks: My child died of "(a) respiratory failure (b) epilepsy (c) cerebral palsy…she spent 5 years in Crownsville State Hospital" (Skloot, 2010, p. 270).

Haraway: That is horrible, Henrietta, I am so, so, sorry. (*The panel members all turn and stare at Donna Haraway. Rheinberger continues.*)

Rheinberger: Unfortunately, no money for the poor is not a new problem.

Haraway: I mean your daughter. Her Daughter. You died here, your daughter died five years later in a place of unspeakable horror all in the name of medical science. (*The panel is starting to wonder about Donna Haraway. She notices they are staring at her.*)

Serres: (*He has been reading in the program during the entire conversation.*) It says here that the hospital had "a serious asbestos problem" (Skloot, 2010, p. 275). Again, as Sandra said…a problem of economics. Money for war, but no money to take care of the sick and needy at home. It says here that in 1955, patients "arrived from a nearby institution packed in a train car…the population was at a record high of more than 2700 patients, nearly eight hundred above maximum capacity" (p. 275).

Harding: This was a horrible place (*reading from her iPad*).

> Crownsville averaged one doctor for every 225 patients, and its death rate was far higher than its discharge rates. Patients were locked in poorly ventilated cell blocks with drains on the floors instead of toilets. Black men, women, and children suffering with everything from dementia and tuberculosis to nervousness, lack of self-confidence, and epilepsy were packed into every conceivable space, including windowless basement rooms and barred-in porches. (Skloot, 2010, p. 275)

Haraway: We also have to think about money for biotechnology. Think about the economics of HeLa cells for a moment. Scientists go into laboratories and come out with living and breathing commodities—attached to real people. "Living organisms can become patentable 'composition of matter'" (Haraway, 1997, p. 90). This is when science gets complicated. Are the HeLa cells considered a living organism, attached to Henrietta? Who owns the cells—they came from Henrietta, but she died, so is ownership passed to her family? In this morning's discussion, it was agreed that George Gey had no desire to make HeLa cells a commodity. Gey wanted to save the world from cancer. However, just because the cells are never patented does not mean that the cells did not become a commodity.

Rheinberger: Should we add as # 2—Science connections to real life, including economics? (*Everyone nods in agreement, and sees that Rheinberger, as session leader, has been charged with keeping the discussion on track.*)

Latour: I want to make sure students of science realize that science is connected to culture. As students of science, we are charged to learn these long lists of facts. These lists are meaningless if students do not see the connections to culture. Take a glance at a basic curriculum map given to a high school science teacher…If this list is indeed an indicator of what is known about science and what should be taught about science it becomes obvious that science "knows nothing about culture" (Serres & Latour, 1990, 1996, p. 86). "Science has all the power, all the knowledge, all the rationality, all the rights too of course, all plausibility or legitimacy, admittedly—but at the same time all the problems and soon all the responsibilities" (Serres & Latour, 1990, 1996, p. 87). Science is looked upon as an all-knowing discipline on "top of the heap, as we say, single-handedly preparing the future" (p. 87). With this scenario, our future is grave.

Serres: "As science advances, we rarely evaluate the substantial cultural losses that correspond to the gains" (Serres & Latour, 1990, 1996, pp. 54-55). Bombings, war, no thoughts of the personal devastation to follow!

Latour: It is obvious that "All scientists can sketch out a brief history in which they place themselves at the pinnacle of reason, after centuries of groping" (Serres & Latour, 1990, 1996, p. 51). Michel, your perspective of science is connected to the war, the bombings. There must be connections—an anchor of sorts—context. Back to the comment about never having heard Henrietta's name in reference to HeLa cells. Teaching HeLa without teaching the entire story of the cells is a missed opportunity for educators. There is so much history in the story, history I believe every medical student needs to know, but more importantly, details every patient needs to know, such as how they should make sure consent forms are read and understood.

Haraway: I need to back up for just a moment. Maybe I am being too analytical and over-sensitive this morning. (*It has been a strange morning, she thinks to herself.*) Dr. Serres, Didn't Einstein try to inform the president about nuclear weapons (Einstein, 1929). I think reflection is very important in these complex matters, constant reflection—not sporadic or because one has made it to the end of a prescribed number of steps. We must be committed to "science-in-the-making" and the making of a science that will cease to "reproduce systems of stratified inequality—and that issue in the protean, historically specific, marked bodies of race, sex and class—for performed, functionalist categories" (Haraway, 1997, p. 36). Is it not new to link the stories of science and democracy, "any more that it is to link science, genius, and art, or to link strange night births and manly scientific creations? However, the interlocking family of narratives in the contemporary U.S. technoscience drama is stunning" (p. 168). Think about Henrietta and her family in the terms of technoscience. We cannot take Henrietta's story and divide it into terms of technology and science. If we do, we neglect the issue that she was a real woman, with a real family. I had never really considered that technoscience may actually be creating another binary in a world that needs to realize the multi-dimensionality and describe how technoscience intersects humanity—maybe qualify it as human technoscience. The more I think about it today, the more passionate I feel about the need for more humanity in science.

Rheinberger: I am trying to keep up here…#3 Science connections to culture.

Latour: Donna, I think your idea of crossing boundaries is what technoscience infers. The interdisciplinary contributions of the philosophy, the history, the culture of our world, all

have to be a part of science. I am not sure if adding human or humanity is necessary, I think it is understood.

Haraway: I think we have to be careful not to disregard any possibilities. We must work hard to "maintain this very potent joint between fact and fiction, between the literal and the figurative or tropic, between the scientific and the expressive" and between Henrietta and HeLa (Haraway, 2000, p. 50). Maybe I am overstating here…but humanity is our priority. "Interdisiplinarity is risky but how else are new things going to be nurtured?" (p. 46).

Rheinberger: I will add #4—Science connections to humanity. (*The others are not very concerned with Rheinberger's list. They all intensely wrapped up in the discourse.*)

Latour: Current boundaries in science bog us down. If science is only being viewed through a lens focused on strict experimentation, we are neglecting a world of possibilities. Think about that simple morning spent with your cup of coffee and the morning paper. The stories are about "global warming, AIDS vaccines, frozen embryos, the Pope and contraception pills" (Doll, Feng, & Petrina, 2001, p. 25). These stories follow a complicated path such as this one I wrote about in *We Have Never Been Modern*:

> The smallest AIDS virus takes you from sex to the unconscious, then to Africa, tissue cultures, DNA and San Francisco, but the analysts, thinkers, journalists and decision-makers will slice the delicate network traced by the virus for you into tidy compartments where you only find science, only economy, only social phenomena, only local news, only sentiment, only sex. Press the most innocent aerosol button and you'll be heading for the Antarctic and from there to the University of California at Irvine, the mountain ranges of Lyon, the chemistry of

> inert gases, and then maybe the United Nations…They seem to say let us not mix up knowledge, interest, justice and power. Let us not mix up heaven and earth, the global stage and the local scene, the human and the non-human. (Latour, 1987, pp. 2-3)

When you see all of this…even though your mind may be fighting to categorize everything into nice little cubicles…it is obvious the named disciplines are mixed. These mixtures "weave our world together" (Latour, 1993, p. 3). This morning all my connections were made through HeLa cells.

(*Everyone on the panel simultaneously says* Henrietta Lacks *in chorus.*)

Latour: Point taken. (*He glances to the back of the audience, and for a moment he thinks he sees someone who resembles that classic figure in the brown suit.*)

Rheinberger: A woven pattern, a spider web, rhizomes—yes, Bruno, this is exactly what I was speaking of earlier. Just like newspapers, science tries to put everything into nice little labeled boxes with predetermined categories allowing for no overlap; the networks that are created by tracing events, in multiple ways. It is no doubt that real events of the world will need to enter into this web. So #5—Interdisciplinarity—science connections to other subjects…history, humanities, mathematics, anthropology, sociology, political science. Help me. What else should I add?

Harding: We cannot make an all-inclusive list. The possibilities are endless.

Haraway: (*appears to be snapping out of a daze, she adds quickly, making eye contact with Rheinberger*) Zoology, philosophy, literature, art, music…

Latour: Let me go back to hybrids for just a moment. I have always defined hybrids as being composed of two competing sides, but remember that each side does not have to be a single entity. If so, then it would just be another binary—I think that is what we all want to avoid. I do not see hybrids as a combination of two things, like a mule, which is the cross between a horse and a donkey, or a pluot.

Rheinberger: A pluot?

Latour: A plum crossed with an apricot (*he says quickly*). "On the left, they have put knowledge of things; on the right, power and human politics" (Latour, 1993, p. 3). Our world views knowledge as an isolated entity, separate and removed from power and politics. The junction that I desire to create shows that science can be connected to people, politics, and policy. This junction provides us with further reasoning that science must be continually in the making (Latour, 1987).

Lacks: (*Addressing Donna*) Hybrids seem to connect everything. But when I hear the word hybrid, I think about those crazy picture shows my sisters and I would go see on Saturday afternoons—maybe, *Jekyll and Mr. Hyde*. Sounds like that is how scientists did and are describing me. Homemaker that saved the world…and cells that destroyed research, labs, and even threatened world peace. I want to know if these connections are just for the scientists. My experience with science was situated on the wrong end of the binary…no hybrid…no connection. Just a poor, black woman in the public ward leaving behind five kids.

Haraway: Henrietta, but you are right. The term hybrid is supposed to show a bringing together of ideas. They should help how people think…but if a hybrid only brings about two

ideas…we just have another binary, like Dr. Jekyll and Mr. Hyde. Scientists have personified the personality of your cells onto you as a person.

Hannah Landecker enters the room and glances across the audience. She stops when she sees Henrietta. She looks away thinking, I must be seeing things*, and addresses the panelists on the stage.*

Hannah Landecker: I apologize for missing your opening. I was assisting with the police report concerning the vandalism that occurred in the exhibit hall. (*Noticing the puzzled faces, she explains further.*) The BioArt exhibit was knocked over and the mannequin's shoes, suit, and earrings are missing. (*She sits down in the empty chair by Donna Haraway.*) We are lucky the whole building did not burn down. Supposedly, there was an electrical short in the pink Henrietta sign. Did I hear someone mention Jekyll and Hyde?

Harding: I cannot believe someone would vandalize the display. Did you all see the display of cells in the lobby? I thought it was very interesting to include living cells in the display. I have not looked through a microscope in years. The cells are very interesting to look at, especially when you simultaneously think about the story. Skloot's book, *The Immortal Life of Henrietta Lacks*, brings science and culture together. She has touched a huge audience base. I like how the artist in the exhibit included pictures and parts of Henrietta's story in the display. That does bring home the point that Henrietta's cells grown in culture came from a real woman…and these cells did affect humanity. (*She whispers to Haraway.*) That woman on the back row kind of looks like Henrietta.

Haraway: That is whom I was speaking to earlier. I thought for a moment that I was the only one seeing her and hearing her.

Latour: Maybe it is time for those new glasses. (*He squints toward the audience.*)

Serres: Sometimes we see what we want to see. If we cannot envision a changing world, we will never see changes take place in the world.

Harding: Change: That is the most important topic of today.

Rheinberger: Oh, we do need to put that science is constantly changing on this list. What are we on, #6? (*He writes* Science continually changing.)

Landecker: Hans, thanks so much for following the directions….I am so happy you are indeed composing a list of what science and science education should include.

Harding: I often wonder "how should philosophies of science be reshaped to account for modern sciences' history, achievements, limitations and possible futures identified in….studies, that share skepticism about the conventional internalist epistemologies of science"? (Harding, 1998, p. 5). I think the "convergences and divergences" as well "feminist components" could bring about revelations to challenge current knowledge traditions (p. 5).

Latour: So a multicultural, feminist point of view…hmm…all connected to history, economics and society.

Rheinberger: #7 Science from a feminist perspective.

Landecker: I commented this morning on how the story was portrayed from a racist point of view. How would the story of Henrietta Lacks be different if it had been told from a multicultural and feminist perspective?

Haraway: Well for starters, I think it is obvious; there would be no racialized language such as aggressive, promiscuous…and the constant use of the word, "she." A cell is a cell; they are not gendered until humans start with the anthropomorphism!

Harding: When telling this story, "cultures and practices of the sciences should be understood to provide the necessary conditions for sciences to do their work, but they should not influence the results of research in any culturally distinctive way. Any and all social values and interests that might initially get into the results of scientific research should be weeded out as soon as possible through subsequent critical vigilance" (Harding, 1998, p. 3). The public ward provided a predisposition of cultural bias, as was common practice in those days of segregation.

Rheinberger: Culture does have a role, but cultural bias does not. When I think about this story, I look at it from a laboratory point of view. Hindsight for George Gey would be 20/20. "There is no pre-specifiable golden path or universal method that can provide a blueprint for knowledge production" (Rheinberger, 2010, p. xvi). We have spoken extensively about the experimental unit today. We know that method can only provide so much assistance in a very chaotic environment. "Research is inherently untidy and requires an appropriate cultural setting that sustains innovation by allowing the new and unpredictable to emerge. Environments that sustain controlled chaos are the heartland of innovation" (p. xvi). A problem in a laboratory is like a problem anywhere else in the world, there should be lots of discussion with a thorough examination of all possible perspectives. I think there probably was lots of discussion, but did anyone think of the story from Henrietta's viewpoint? The perspective of her family? Did scientists consider the future possibilities and implications for science? Problems viewed in isolation will

most likely be addressed in a very narrow-minded way. This story is interdisciplinary. Chaos was created from the moment; Kubicek had to figure out a way to store all those cells. Gey had to figure out what to do with them. When chaos is created, the goal is to control it. "Environments that sustain controlled chaos are the heartland of innovation" (p. xvi). I guess what I am saying is that all the perspectives would have something to offer…leaving out other tellings of the story narrows the outcome. Did they leave out Henrietta's name for her own protection?

Serres: (*He has continued to read while listening to the conversation.*) I think everyone in the lab knew exactly from whom the cells came. It says here in Skloot's book "The Minneapolis Star became the first publication to name the woman behind the HeLa cells…but the reporter got her name wrong" (Skloot, 2010, p. 105). "Keeping patient information private was emerging as a standard practice, but it wasn't law" (Skloot, 2010, p. 107).

Haraway: I think people might see Henrietta's role differently if I share with you the story of the OncoMouse™. The OncoMouse™ is "a breast cancer research model produced by genetic engineering" (Haraway, 1997, p. 47)—it is a genetically modified mouse that carries a specific cancer-causing oncogene. "As a model, the transgenic mouse is both a trope and a tool that reconfigures biological knowledge, laboratory practice, property law, economic fortunes and collective personal hopes and fears" (p. 47). Can you flip on that projector for me, Hans? The painting shown depicts the white female mouse, complete with breasts and a crown of thorns. "She is a Christ figure, and her story is that of the Passion…The laboratory animal is sacrificed; her suffering promises to relieve our own; she is a scapegoat and a surrogate" (47). I see the chamber as comparable to the cubicle

chamber and to a box that "mimes the chamber of the air-pump in Robert Boyle's house in 17th century England (p. 47). In this chamber in Robert Boyle's laboratory, "small animals expired…to show to credible witnesses the workings of the vacuum air-pump so that contingent matters of fact might ground less deadly than social orders" (p. 47). The mouse in present day "is a figure in secularized Christian salvation history and in the linked narratives of the Scientific Revolution and the New World Order—with their promises of progress; cures; profit; and if not of eternal life , then at least of life itself (p. 47). Science is all these things. Science promises us solution to current problems. Science promises us cures from diseases with gene therapy. The OncoMouse™ has witnessed it all. When we speak of curriculum, OncoMouse™ verifies for me that Science should be interdisciplinary. The history and the story behind the OncoMouse™ are evidence that Science needs the humanities in order to tell a story that the world finds relevant. Science should know no bias to gender or race, Science should simply know humanity and all that humanity encompasses.

Let us take a moment and return to 1951, right here at Johns Hopkins. It is not OncoMouse™ or Boyle's small rodents. George Gey, Howard Jones, and George TeLinde have placed Henrietta Lacks in a box of sorts. Henrietta Lacks becomes the object of circumstances. Her box is the public ward—there are no windows. No one is looking down on Henrietta, because no one knows who she is. The world is looking at HeLa cells to be the savior, but the idea that these cells are connected to their donor is only done through stereotypical racialized language. Henrietta herself is invisible. Take this story one step further to Crownsville. Again, there are no windows—no one to see Elsie or the others who died needlessly. The men and women that arrived healthy died

because there were no windows, no eyes looking on—no one cared. The feminist version of this story spares no details. The story if viewed through multiple lenses will give rise to multiple versions. In the feminist version, Henrietta would be part of the HeLa story.

Harding: Why consider science from the view of gender difference? This perspective "leads us to ask questions about nature, and social relations from the perspective of devalued and neglected lives. Doing so begins research in the perspective from the lives of 'strangers'…It starts research in the perspective from the lives of the systematically oppressed, exploited, and dominated" (Harding, 1991, p. 150). I can go back to strong objectivity here, the feminist point of view "requires a commitment to acknowledge the historical character of every belief or set of beliefs—a commitment to cultural, sociological, historical relativism" (p. 156).

Haraway: I want to make sure the audience understands that feminist science is not just science for women; it is a science that is all-inclusive of those continually left out. This point of view will take on issues involving the fact that stereotypical laboratory or experimental life "required a special, bounded community" (Haraway , 1997, p. 25). We must make an effort to begin "restructuring that space [which]—materially and epistemologically—is very much at the heart of late-twentieth-century reconsiderations of what will count as the best science" (p. 26). That restructured community will need to include scientists, teachers, everyday people, Henrietta Lacks, and others.

(*Rheinberger looks at his watch…there is only 15 minutes left in their session.*)

Rheinberger: How about I record for #8—Science is not just for scientists, it must include all participants? Not to change gears abruptly, but there is one more aspect of this

discussion I would like us to consider. I want us to go back to why science must be situated in what is going on with society. Have you ever thought about the role of science in "Industrialization, the saturation propaganda of governments and advertisers, two world wars, the concentration camps, the dimming of faith by Science, and of course the constant threat of nuclear annihilation" (Wolff, 2003, p. 52)? Science brought about advances that made industrialization possible. Propaganda and advertisers would be helpless without the technology science brought into being. Weapons for war, methods for torture changed lives forever.

Harding: Think about industrialization from a Western point of view. Our "modern Western sciences and their technologies have always been regarded with both enthusiasm and dread" (Harding, 1991, p. 2). Giving credit where credit is due, we owe "at least some responsibility for the high standard of living that many in the West enjoy—especially if we are white and middle or upper class" to modern sciences and their technologies (p. 2). I don't think any one of us sitting here today would "want to give up the food and clothing, medical treatment, cars and airplanes, computers, television sets, and telephones that have become available through scientific and technological development" (p. 2). On the flip side of the coin, "just who or what is responsible for atomic bombs, Agent Orange, industrial exploitation, polluted air, and vast oil spills, dangerous contraceptives such as Dalkon shields, inappropriate uses of Valium, health profiteering, and high infant mortality in the United States?" (p. 2). We could add "famine in Ethiopia, and the development of a black underclass in the United States" to the list (p. 2). Science is willing to take full credit "for the good aspects of the Western way of life" but "misuses and abuses are entirely the fault either of politicians or of the industries that apply

supposedly pure information in socially irresponsible ways" (p. 2). In Mary Shelley's dystopian novel, the scientist's name, Frankenstein, "in popular thought migrated to the monster that he [Frankenstein] inadvertently created" (p. 2). The monster is "created—gets nourished and reproduced day after day—retreats into the shadows" (p. 2). The monster becomes part of the shadows…the place where "there are no persons or institutional practices that we can hold responsible for the shape of the sciences and the kind of social order with which they have been in partnership" (p. 2).

Landecker: The Frankenstein connection is very important. It is very easy for science not to be held responsible. Think about Henrietta. It was very easy to keep her cells growing in the shadows, especially before her name was released to the public. The doctors took her cells without permission…but it was "okay" because it was the practice of the day. Her cells were sent all over the world, but no one ever paid for the cells. Did George Gey, ever consider "what scientific, legal, economic, and rhetorical practices maintain the condition of their existence" (Landecker, 1999, p. 205)? It is almost like the cart before the horse problem, create the science, and then find a use for it. Serres, do you think scientists refused to take responsibility for the creation of the bomb?

Serres: "As a child of the war and its bombings formed by the horror of the concentration camps, I have always preferred to construct or put together rather than destroy" (Serres & Latour, 1990, 1996, p. 26). "I love and seek peace which seems to me the ultimate good" (p. 24). Even with my efforts toward seeing the ultimate good, the tragedy brought about by science cannot be ignored. "As soon as inventions or scientific results and projects pose redoubtable global questions, touching people's lives or the survival of the globe, we hear the cry 'Let's form ethics committees; let's bring in the legal profession, philosophers,

and the clergy'" (Serres & Latour, 1990, 1996, p. 86). Ethics committees were formed after the fact. We cannot forget uncomfortable parts of our history such as Hiroshima. "Hiroshima was truly the end of one world and the beginning of a new adventure. Science had just gained such power that it could virtually destroy the planet" (p. 87). Hannah Arendt (1951) tells us that "we can no longer afford to take that which was good in the past and simply call it our heritage, to discard the bad and simply think of it as a dead load which by itself time will bury in oblivion" (p. ix). On one hand Hiroshima was a horrible tragedy initiated by science and power. On the other hand some felt it was necessary to save the world from war and save lives.

> The first atomic bombs were dropped on Hiroshima and Nagasaki on the 6th and the 9th of August 1945, and they presented the ideal conditions: great mechanical effectiveness, complete technical surprise, but above all, the moral shock that suddenly banished to the prop-room the earlier strategic carpet-bombing of large Asian and European cities, with all its logistical sluggishness. By demonstrating that they would not recoil from a civilian holocaust, the Americans triggered in the minds of the enemy that information explosion which Einstein, toward the end of his life, thought to be as formidable as the atomic blast itself. (Virilio, 1989, p. 8).

This brings to life memories of a horrible event in history brought about by science. The Manhattan Project brought together top scientists to develop weapons of mass destruction. The destruction was witnessed by the world…yet the world did not learn very much. The information relayed that life itself is less important than the power

these weapons provide. We need to keep those memories alive so history will not repeat itself. Unfortunately, "time heals, but it does so through erasure" (Rowlands, 2009, p. 4).

Haraway: At the Los Alamos National Laboratories in New Mexico, there is an exhibit about the "first atomic bombs built during the Manhattan Project" (Haraway, 1997, p. 53). The exhibit is "rather mouse nibbled and time-worn; it looked like old news" (p. 53). "The more glitzy projects" such as the "Human Genome Project" and the "artificial life research" appear to take precedence over the H-bomb (p. 53). "Nuclear weapon research—albeit still quite a growing concern—is almost, but not quite, an embarrassment even at the birthplace of the atomic bomb" (p. 53). The Human Genome Project has been greeted with wonder and expectations of curing diseases of all forms.

Serres: Look at how our biosphere has progressed over the last 50 years. We can micro-engineer body implants and procreate organisms for the sole purpose of providing organ replacements. The "bricolage of transgenic monsters, cloning of cells, etc.—should be greeted with a sense of awe, even if one doesn't believe that the human body had necessarily reached its final stage" (Virilio & Lotringer, 2002, p. 17). He calls this an "assault on the human race...too reminiscent of ethno-genocidal horrors for anyone to trust the neutrality of science" (p. 17). I can relate to Virilio's telling of this story. I did not experience the carefree youth that most of our privileged students of science enjoy. My generation was impacted and traumatized by "violence, death, blood and tears, hunger, bombings, and deportations" (Serres & Latour, 1990, 1996, p. 2). "Now that I am older, I am still hungry with the same famine, I still hear the same sirens; I would feel sick at the same violence, to my dying day" (p. 4). The horrors I witnessed shaped my very being. Science created the weapons of mass destruction that created the violence that

my generation endured. I have built a life searching for peace. In order to find peace, I found myself creating, synthesizing, and inventing—my own self-taught style of philosophy. "When a person's life begins with the experience and atmosphere of death, it can only move forward in an ongoing spirit of birth, of rebirth, of a positive and overflowing wellspring of exhilaration" (p. 42).

Henrietta: My children did not experience a carefree youth either. Mother burned from inside out with radiation…sister dead in hospital for the Negro Insane…children abused following mother's death. Carefree youth was something my children never knew either, Dr. Serres.

Serres: Human, collective, political, economic, social conditions—poverty for example—prevail, and by far, over the purely physical cause "How is it that the lights we receive from the sciences are sometimes accompanied by such blindnesses? The better we know, the more we can. How to go from these possibilities to the real without posing the problem of evil? What responsibility did the scientists of the Manhattan Project formerly bear?" (Serres, 2010, 2012, p. 58).

Lacks: I know I can never equate what happened with me to the horrors of Hiroshima. Still, I cannot help but think that the scientists had some responsibility in my story as well.

Serres: Let us go back and hover over the past for a moment. "Supposing that we had foreseen everything, what would we have done? One does not stop science or progress, even less the necessity to win a just war" (Serres & Latour, 1990, 1996, p. 59). Is it an issue of the "libido of the dominant males that always drives them to show themselves to be the strongest of all, the fierce competition, and the passion of small brains to arrive first" (p.

59)? A simple contest? A sporting event of sorts? Think about the Manhattan Project celebrities, "vainglorious and appearance-conscious like prima donnas, wanting to succeed at all costs, before the Nazi physicists" (Serres, 2010, 2012, p. 59). Going back and looking at the past is only productive if we consider the lessons of the past, in reference to issues that need resolution in the present and future. "If yesterday's truth is tomorrow's error, then in the sciences it likewise happens that the error condemned today will sooner or later find itself in the house of great discoveries" (pp. 52-53). Past or present discourse is a necessary element of science for the examination of such issues.

Rheinberger: I am adding discourse in science as # nine. I think that is an obvious addition. Discourse will be necessary to solve the modern day problems involving science.

Haraway: Science is the result of located practices at all levels" (Haraway, 1997, p. 36). "The point is to make a difference in the world, to cast our lot for some ways of life and not others. To do that one must be in action, be finite and dirty, not transcendent and clean" (p. 36). "We must, however, be acutely aware of the dangers of using old rules to tell new tales" (Haraway, 1991, p. 42). Science can be viewed as a process that is "resolving the contradiction between or the gap between human reality and human possibility in history" (p. 42).

Serres: "Caused, causing, all things in the world ensue from each other, chained together" (Serres, 2010, 2012, p. 129). "Whether fluid or of air even solids communicate things respire together, they conspire with different breaths, but in constant and total circulation that's chancy, torn, chaotic and consenting" (p. 129).

(*The conversation ends abruptly.*)

Rheinberger: Unfortunately, we are out of time. Do we have any quick questions or comments from the audience? (*The restless audience begins to leave.*)

Hoffen: (*sitting on the front row*) I have one question. Can Henrietta Lacks become part of this New Science?

Henrietta begins walking toward the stage, as others are leaving the room, some glance at her, others just walk by, unaware of her presence.

Rheinberger: I noticed you have Rebecca Skloot's book. It looks as if it is worn from a lot of study. What do you think? Here is the brief shopping list of sorts we created today concerning what elements are necessary for science to be meaningful to all students of science. To all participants of science, this list needs to be proofed, revised, and maybe even reordered…but what do you think?

1. Basic laboratory skills of inquiry/not strict method
2. Science connections to real life, including economics
3. Science connections to culture
4. Science connections to humanity
5. Science connections to other subjects (Interdisiplinarity…history, humanities, mathematics, anthropology, sociology, political science, and more)
6. Science connections to constant change
7. Science from a feminist perspective
8. Science is not just for scientists, it must include all participants
9. Science must incorporate Discourse in order to solve problems
10.

Oh no…I thought we had 10. Hannah wanted 10.

Hannah Landecker: Hans (*shaking her head and smiling*). You know I need 10.

Hoffen: (*interrupting*) I have a very difficult time separating Henrietta from her cells. We as human beings are connected to this story of Henrietta Lacks through the antibodies of poliovirus that pulse through our veins. We are connected anonymously, until the moment we hear Henrietta's story. The polio vaccine was tested on HeLa cells. Henrietta was a a living, breathing woman struck down by what started as a microscopic tumor-producing virus, HPV (human papillomavirus), and grew like rhizomes to overtake her body. Her name and face were both lost in the public wards of Johns Hopkins Hospital. The poliovirus was received first by the privileged white scientists. This vaccine was made with a poor black woman's cancer cells. Her family left behind to take care of themselves in an unbroken cycle of poverty that continues to marginalize and reduce opportunities for those of specific genders, race, and class. *Henrietta walks right up beside the group. Hoffen glances back and jumps. Is what she is seeing real? Some audience members turn and see the beautiful African-American woman, dressed in a brown suit standing in the front with the panel. Some gasp at the resemblance between her and the mannequin they had observed the day before in the exhibit hall. Others continue to walk out, not seeming to see her. The panelists have their eyes and ears glued as she begins to speak.*

Henrietta: You are telling my story. Can science hear my voice? Or am I simply a dead branch wavering in the wind? A ghost—visible to only a small few, who believe the "universe is

composed of stories" (Rukeyser, 1968, p. 11)? Those who know me as Henrietta, not just HeLa.

Serres: (*making eye contact with Henrietta*) *Yes*, some can hear your voice and see you here today. Others will not open their minds to hear nor see you. It is interesting, "the sciences are beginning to discover…the trees themselves emit voices. Who chatters in this concert? Who speaks in total...I wager that tomorrow advanced science will attempt to reproduce…orchestrations of Flora and Fauna and publish the scores" (Serres, 2010, 2012, p. 133). Ha (*he chuckles*). Along with those beautiful concertos, Henrietta, I believe your voice can be heard, and has been heard today in this place.

Lacks: So how do we make these changes? War, arguments, and lawsuits rarely bring about any gains or changes.

Serres: I agree, "Neither debate nor criticism makes any advances, except on the social chessboard and in the conquest of power" (Serres & Latour, 1990, 1996, p. 37). What must happen tor "advancement in philosophy and also in science, is inventing concepts, and this invention always takes place in solitude, independence, and freedom—indeed in silence" (p. 37).

Hoffen: In solitude, maybe your voice can be heard, and the voices of others like you. Each of us must find a space where transformation can take place. It will be in solitude that we make a decision to tell your story and the story of others, or to remain silent.

Serres: (*to Hoffen*) You spend time in solitude, studying, very passionately. That is why you can see and hear Henrietta. I assume you are an educator. Or maybe a graduate student? What can you tell us about what science and science education should encompass?

Hoffen: "The true purpose of education was to prepare people to deal with …socially relevant questions—to equip them for the age in which they live" (Deboer, 1991, p. xii). If we look and "see what has been lost and gained by each major shift in the past," we can "head with greater vigor in the direction of social responsibility and socially relevant instruction in science" (p. xii). As we move forward in time, there will be more stories like Henrietta's. In an age where the human genome moves to the forefront of science, there will be other ways in which people are segregated, not by race, or sex, but by specific genes. The idea is to continue to move forward. We must pay attention to the stories along the way. We must often revisit the past and hover a moment…Answers we seek maybe in something that science has already seen.

Serres: "Time flows in an extraordinarily complex, unexpected complicated way…it twists and folds" (Serres & Latour, 1990, 1996, p. 58)**.**

The group looks up and Henrietta has vanished into the crowd. They are all quite bewildered at the day's events.

Landecker: Where did she go? We have certainly experienced a "fold" in our day (Serres & Latour, 1990, 1996, p. 58).

Rheinberger: I like that reference, Hannah. "The history of science understood as the past of a present-day science, is by no means a blueprint, read backwards, of the chronological unfolding of a given science in a given period" (Rheinberger, 2010, p. 39)**.** It is stories, many stories that can be linked together in multiple ways.

Serres: "Philosophy can be summed up in little stories." (Serres & Latour, 1990, 1996, p. 25). Have we not all experienced many small stories in this session; stories from science,

stories from scientists, OncoMouse™, HeLa cells, Henrietta, Henrietta's family, and stories about each of us as we participated this morning?

Rheinberger: Together we have brought what we know about science, our stories, and our cultures. "Science might even be described as the most profoundly 'historical' cultural enterprise, since scientific achievements are defined precisely by the possibility in principle to become suspended. Science is only science as a constant process of becoming" (Rheinberger, 2010, pp. 40-41).

Landecker: Another layer of complexity in this hierarchy of stories is how Henrietta's "story is simultaneously what happened to a person and her body and a narrative vehicle through which journalists and scientists have imagined and witnessed the possibilities for lives and bodies constantly being changed" by a system of ever-evolving technologies that are of human origin (Landecker, 2000, p. 54). The interaction shows us how science is made.

Latour: Amazing discourse, my colleagues…Science, HeLa, and a mysterious visit from Henrietta.

Hoffen: Dr. Rheinberger—I have an idea for your # 10 on the list. How about—Henrietta Lacks. Maybe Stories behind scientific developments. Hmm…maybe that is too narrow…How about: Bring stories to science; let Henrietta and stories of unknown others be told, shared, and created. Maybe create complex connections with stories of science, participants of science…Maybe…

Hoffen's head is spinning with ideas. The group continues to talk to members of the audience. The stage goes black.

Postscript: Components of Curriculum

Creating curriculum is not a simplistic endeavor. Curriculum should be fluid and flowing or in constant motion like a pendulum or seesaw. As curriculum moves through time, touching each participant, it grows. "The most elaborate narratives, myths, and icons always return us to this point of chiasmic see-sawing" (Guattari, 1995, p. 98). During this back-and-forth process…similar to a pendulum swinging, "something is absorbed—incorporated, digested — from which new lines of meaning take shape and are drawn out" (p. 96). Teachers must expose students to opportunities in the classroom that create discourse in thinking. "Scientific discourses are lumpy; they contain and enact condensed contestations for meanings and practices" (p. 204). If teachers continue to give out solitary answers and give an impression to students that they are all-knowing there will be an absence of learning. Through conversations concerning stories relating to the curriculum, thought processes can be disrupted and new ideas constructed. All participants of curriculum must be able to "wander and wonder" through the world, conversations, and encounters (Schubert, 2009a, pp. 231). With all the different wanderings and wonderings the new fabric could be woven, something new that has never been before. I would think this new fabric could become a bridge between old perceptions and newly developed perceptions.

Jacques Derrida assures us that flaws do not reside in science or one's philosophy alone. He tells us "indeed, one must understand this incompetence of science which is also the incompetence of philosophy, the closure of the epistémè" (1974, p. 149). This incompetence opens up new places for new perspectives and new knowledge. Neither science nor philosophy is ideal; both must incorporate as many visions as possible. We as educators and students must explore the space in between the two entities: "The natural tendency of theory—of what unites

philosophy and science in the epistémè—will push rather toward filling in the breach than toward forcing the closure" (p. 148). By generating stories, a third space between science and philosophy is created. "Stories are a core aspect of the constitution of an object of scientific knowledge" thereby giving them authority in the science classrooms in a postmodern society (Haraway, 1991, p. 82). It will be the culmination stories of scholars, educators, students, and the scientists, who all become characters, in an ever-changing curriculum that will "fill the breach" in today's science classrooms (Derrida, 1974, p. 148).

CHAPTER SIX

CONSPIRACY TO INTERRUPT SCIENCE AND SCIENCE EDUCATION

Enter Henrietta's Immortal Cells

Henrietta spent two days at Johns Hopkins Hospital following her first radium treatment. Down in George Gey's lab, Mary Kubicek was taking care of those famous test tubes labeled HeLa, He for Henrietta and La for Lacks. "Mary started her days with the usual sterilization drill. She peered into the tubes, laughing to herself and thinking, *nothing's happening. Big surprise*" (Skloot, 2010, p. 41). Henrietta left the hospital with an appointment to return for another radium treatment two and a half weeks later. Just two short days after Henrietta went home to Turner Station, something odd occurred down in George Gey's lab. "Mary saw what looked like little rings of fried egg white around the clots at the bottoms of each tube" (p. 40). Henrietta's cells were surviving, "they were growing with mythological intensity" (p. 40). The cells grew and filled up "as much space as Mary gave them" (p. 40). George Gey and Mary watched with caution. Both were expecting the cells to die suddenly—>like all the other cells over the last 20 years. "Soon George told a few of his closest colleagues that he thought his lab might have grown the first immortal human cells. To which they replied, Can I have some? And George said yes" (p. 41).

It is obvious at this moment in time that the last thing on George Gey's mind is dollar signs or issues of who actually owned Henrietta's cells. Gey was in this work for the science. Originally, Gey wanted to find a cure for cervical cancer. Henrietta died of that disease in October 1951. Shortly thereafter, planning began for a HeLa factory, a massive operation that would grow to produce trillions of HeLa cells each week. It was built for one reason: to help stop

polio. “The world was in the midst of the biggest polio epidemic in history. Schools closed, parents panicked, and the public grew desperate for a vaccine” (Skloot, 2010, p. 93). Jonas Salk had “developed the world’s first polio vaccine, but he couldn’t begin offering it to children until he’d tested it large scale to prove it was safe and effective” (p. 92).

The National Foundation for Infantile Paralysis (NFIP) had been using monkeys to test Salk’s vaccine. All the monkeys were “killed in the process” of testing (Skloot, 2010, p. 94). Today this would have been a huge issue of animal welfare, but in 1952 the problem was one of economics…monkeys were expensive. Testing Salk’s vaccine on monkey cells would cost millions. The NFIP contacted George Gey. This organization was offering cell culturists a possible $50 million to mass produce cells for research. George Gey began working out the details.

In April 1952, approximately one year after Henrietta’s cells had become the first immortal human cell line, George Gey and William Scherer, both now serving on the NFIP advisory committee, tried infecting HeLa cells with polio virus. The surprised researchers were amazed that HeLa cells could easily be infected with polio virus. The two very excited researchers began experimenting with ways to ship HeLa cells all over the world. Scherer was chosen to oversee operations of the new HeLa cell distribution center to be located at the Tuskegee Institute. Charles Bynum was the “director of Negro Activities” for NFIP (p. 96). Bynum, a science teacher and civil rights activist… “was the first black foundation executive in the country” (p. 96). “He wanted the center to be located at Tuskegee because it would provide hundreds of thousands of dollars in funding, many jobs, and training opportunities for young black scientists” (p. 96). *The New York Times* (1955, p. 25) published a story with a headline reading: “UNIT AT TUSKEGEE HELPS POLIO FIGHT: Corps of Negro Scientists Has Key

Role in Evaluating Dr. Salk's Vaccine." The news story included photographs of African – American women examining cells with microscopes. "Black scientists and technicians, many of them women, used cells from a black woman to help save the lives of millions of Americans, most of them white" (1955, p. 25).

This complex chain of events involving taking a woman's cells, growing them in a laboratory, using them to test polio vaccine, creating a HeLa factory, and opening up opportunities for African-American scientists to work in the field of scientific research, invites us to see that *The Immortal Life of Henrietta Lacks* is not just the story of an ordinary Baltimore housewife who died of cervical cancer. Her cells are alive today. The story of her cells not only chronicles success in defeating polio, but the cells created a pathway for women and persons of color to enter the field of science. What began as a simple act of collaboration and sharing of cells had now turned into a huge operation. We know what this operation meant for science. The eradication of polio means that every man, woman, and child on the planet has benefited from Henrietta's cells. We have immunity to polio pulsing through our bodies all because scientists were able to test the polio vaccine on Henrietta's HeLa cells. The story does not end here, it provokes many questions. How would Henrietta have felt about her cells being used? What happens to Henrietta's family? What aspects of this story need to be part of science curriculum? What parts of this story should be part of the conversation concerning science and science education?

In a world where traditional ideas of science seem prevalent, John Weaver, Peter Applebaum, David Blades, Patti Lather, and Nancy Cartwright each bring a unique perspective on why science education has to change in order to meet the needs of a changing society.

Through a careful examination of science, illuminated by curriculum theory, these authors bring unique perspectives that could make science a vehicle for creating a more democratic society.

In the following scene, I hope to unravel this idea of what science is in reference to today's society, and all its cultures. Economics can impact both society and cultures. Can economics impact the doing of science? Did the discovery of HeLa cells start the precedence for scientists to consider science beyond the science in reference to participants and society? How is science impacted by the commodification of the human body, human organs, or human cells like HeLa?

Act VI: Conspiracy to Interrupt Science and Science Education

Characters in order of appearance: John Weaver, professor; Margaret Hoffen, graduate student/teacher; Peter Appelbaum, professor; Nancy Cartwright, professor; David Blades, professor; Patti Lather, professor; Henrietta Lacks; Security Officer; Polly Merase, Cellular News Network reporter; Priscilla Wald, professor; Hannah Landecker, professor.

Members of the panel make their way to the front of the room as audience members file in and take their seats. The panel moves the chairs from behind the table and form a semi-circle in close proximity to the audience, filled with mostly graduate students, and a few university professors. After a short time of greetings and hand shaking, John Weaver checks his watch, opens his notebook, and addresses the panel.

Weaver: It is 11:00. I say we get started. Maybe we should start with introductions for our audience. I am John Weaver. I had a very interesting journey to Johns Hopkins. You might say I got lost. *He smiles at Patti Lather as he says this. Patti Lather (2007) had published a book called* Getting Lost.

Lather: So John, you are saying that you found yourself "in an awkward position that was not so much about losing oneself in knowledge as about knowledge that loses itself in the necessary blind spots of understanding" (Lather, 2007, p. vii). We have to take time to examine those blind spots in our thinking. What did you find while you were getting lost?

Weaver: First of all Patti, I actually found myself physically lost. During this excursion, I had the opportunity to learn much about the many obscurities associated with the story of Henrietta Lacks. I managed to find myself in Clover, Virginia. Any of you ever been there? *He looks out at the audience and shakes his head slightly.* Henrietta Lacks was born and buried in Clover. She was living in Turner Station when she was a patient here at Johns Hopkins. It is Henrietta's cells that this conference is cell-e-brating…did you get my play on words? I was dumbfounded to have accidently found myself lost in Henrietta's hometown. It was all somewhat surreal, considering the focus of our conference. As I was looking for the jack in the trunk of my rental car to change a busted tire, a man approached me. His name just happened to be Cootie Lacks. Cootie is Henrietta's cousin. There was no tire jack. Fortunately, for me, Cootie was a very animated story teller. He shared Henrietta's story with me from a very different perspective. Henrietta's story, until Rebecca Skloot's 2010 book, *The Immortal Life of Henrietta Lacks*, has rarely been told from the point of view of her family. This area might be what Patti would call a blind spot. And yes, I had to be willing to listen, as Cootie poignantly pointed out to me. I was lost, had a flat tire, and no cell phone service. I was getting nowhere fast. Hearing Cootie's perspective of this story allowed me to develop a new perspective on Henrietta's story.

My goal here today is to make sure we examine science from many perspectives. I am very interested in taking on the task of securing a science education for students of all ages, all cultures, and all backgrounds that is applicable to the world in which we live. I think I can say that collectively all the members of our panel today are very "interested in banishing what Bruno Latour in his book, *Pandora's Hope*, calls a brain-in-a-vat approach to science" (Latour, 1999, p. 4). Think about a brain disconnected from the body. Everything that can possibly simulate this brain must be provided from the outside. The brain-in-a-vat "approach exempts science from being responsible for that which it creates" (Weaver & Anijar, 2001, p. 247). The panel assembled here today is looking to find a replacement for this brain-in-a-vat approach. A science that is connected to the world.

We feel that science can be resurrected with "pedagogies of the cultural studies of science" (p. 247). Donna Haraway says we want students who are "bumptious technoscience actor[s]" (Haraway, 1997, p. 94). By using the word bumptious…she is stressing that students must take an enthusiastic passionate role as participants in their world of science and technology. Today, I want to make connections that will create a new perspective for science and the students of science where "science is not dismissed nor worshipped but utilized to construct a democratic and sustainable world" (p. 247).

Appelbaum: I kind of like that word…bumptious… Can students be bumptious learners in a standardized environment with all the current standardized testing? Hmm. *He appears to be drifting deep into thought.* Oh, sorry, I am Peter Appelbaum. I think we must find a way to have real conversations "about the pedagogies of science" at all levels of education, secondary education included (Appelbaum, 2001, p. 111). Philosophers and

historians of science often "under theorize education and inadequately address educational institutions of science" (p. 111). Meanwhile, those participating in these ongoing debates "are curiously absent from contemporary educational studies. And educators often accept a stereotyped and monolithic perspective on science" (p. 111). There is a disconnect between the theorists working at the university level and teachers working in public schools. There are many connections to science that we must explore. I would be interested to see "how might a conversation among scientists, and colleagues who teach science methods and those in curriculum theory unfold" (p. 124). I use the term science methods loosely here. I am not speaking only of the old-school scientific method. I am referring to professors on the university level who are teaching their students how to teach science.

Cartwright: I know it is not my turn, but I must say Peter that I think physicists might be guilty of undertheorizing the applications of physics to real-world situations. "My ultimate concern in studying science is with the day-to-day world where SQUIDS (superconducting quantum interference devices) can be used to detect stroke victims and where life expectancy is calculated to vary by 35 years from one country to another" (Cartwright, 1999, p. 5). Yes, you have to know your physics…but how the physics is applied is what should be stressed. "I look at the claims of science, at the possible effects of science as a body of knowledge, in order to see what we can achieve with this knowledge" (p. 5). I approach this issue with "the motive of a social engineer" (p. 5). There is more to physics than correctly calculating the appropriate mathematical formula. I think we need to ask a bigger question. "How can our world be changed by science to make it the way it should be?" (Cartwright, 2015). Peter, I like how you are using the

term method…"The scientific method is a broad church indeed," a church that should be opened up to encompass more than a strict plan that is thought to be applicable to all situations (Cartwright, 2015).

Weaver: I think we might have to call Nancy here bumptious. Science for the sake of science is not very meaningful. I agree, the meaning is in those real-life connections. We could probably spend a whole day talking about scientific method. Margaret Hoffen, my graduate student sitting here on the front row, wrote a paper about the scientific method taught in schools called "Pink Rats Have Excellent Racing Cars," early in her graduate program. She employed this mnemonic device to help her students remember the steps of the scientific method: problem, research, hypothesis, experiment, results, and conclusion in the right order for their standardized test. I know from Margaret's paper that she discusses method in broad terms with her students as well. However, the students must be able to regurgitate this specific method. I hope today that we compose a plan to make sure that the steps are not all that students are learning in science class. Shall we continue? *He motions to David to continue the introductions.*

Blades: Good morning, I am David Blades. I am here to speak on behalf of students of science. Learning scientific method is not a horrible thing. I like the use of the mnemonic device, Margaret. It is clever. I would venture to say that you let your students create that mnemonic. Empirical science has a place…but there has got to be more.

> After years of learning to regurgitate information that has no relevance to their lives and no particular significance, except for the few who become professionally involved in the discourse of modern science, their vision and curiosity die, leaving

> only a lingering disgust that after so many years of learning science they really have learned little that is worthwhile. (Blades D. W., 2001, p. 72)

My heart's desire is to return science to a place where we, students and teachers, "find hope" (p. 82). Hope for a curriculum that is meaningful.

Cartwright: Now that it is my turn, my name is Nancy Cartwright. I am a physicist. I was thinking that I need to apologize for going out of turn…but then I began thinking that being called bumptious is an extreme compliment…so I will not apologize. I must say I that I am feeling a little conspicuous about sitting among such a distinguished group of curriculum theorists. Being called bumptious is new, but feeling conspicuous in a group of scholars is not. I must confess, "I differ so radically despite our shared interests" from leading philosophers of physics (Cartwright, 1999, p. 5). Most of "their interest in science generally comes from their belief that understanding our most advanced scientific representations of the world is their best route to understanding that world itself" (p. 5). I am interested in science from a different perspective. A perspective concerned with, "not primarily the little politics of laboratory life" but life "that shapes the internal details of science," details such as "big politics that builds bombs and human genomes" (p. 5). My perspective and interest in science is "different again from most historians and sociologists of science whose immediate object is science itself, but—unlike philosophers who use our best science as a window to the world—science as it is practiced as a historical process" (p. 5).

Weaver: Nancy, you are in good company; everyone on this panel has written books that are different from most books written about education. Proceed!

Cartwright: The name of my most recent book is *The Dappled World*. "The laws that describe this [dappled] world are a patchwork, not a pyramid. They do not take after the simple elegant and abstract structure of a system of axioms and theorems. Rather they look like—and steadfastly stick to looking like—science as we know it: apportioned into disciplines, apparently arbitrarily grown up" (Cartwright, 1999, p. 1). "The dappled world is what comes naturally; regimented behavior that results from good engineering" (p. 1). I work to contest the laws of science that seem to be carved in stone. I have a question to ask here. Does science curriculum and science education continue to address a science that is not representative of all that science encompasses? David, I worry about my students as well. I think students are well versed in some aspects of science. They know, as do I, that an oak tree will grow from an acorn, "but not from a pinecone; that nurturing will make [a] child more secure; that feeding the hungry and housing the homeless will make for less misery; and that giving more smear tests will lessen the incidence of cervical cancer" (p. 23). I am a physicist, but as you can see all these topics relate to me as a human being. Now getting closer to my field of physics, which is ultimately my topic here, I offer the following examples:

> I can drop a pound coin from the upstairs window to my daughter below, but probably not a paper tissue; that I can head north by following my compass needle so long as I am on foot and not in my car. I know these facts even though they are vague and imprecise and I have no reason to assume they can be improved on. Students do not need to have a perception of science that involves everything fitting together like a well-planned puzzle. Laws of physics can be true, but not universal. (Cartwright, 1999, p. 37)

Lather: I have to confess Nancy, I had to google SQUID. I have never heard about superconducting quantum interference devices. It sounds like something out of a science fiction movie. My first thoughts were of the ink-shooting cephalopod.

Appelbaum: That was at least a scientific stab in the dark, Patti. My brain went right to calamari, fried with some type of spicy sauce. It must be getting close to lunch time. Please forgive my digression and continue.

Lather: It is interesting that someone might be able to have an EEG (electroencephalogram) without all those electrodes attached to their bodies. The sensitivity of the technology is amazing. I will send everyone the link I found about SQUID devices. I am obviously not a physicist, but I do have a love for learning new things, especially when they relate to the world I live in**.** Oh, my name**…**I am Patti Lather. I want to talk about detours a moment. John may have had the most interesting detour, meeting Henrietta's cousin, Cootie…but his story describes an aspect of learning that needs to be part of science and science education. I have studied and written about this phenomenon of getting lost for several years. What would happen if those of us given the task of writing curriculum and educational policy could spend some time "getting lost" and really taking in all that educational policy includes? "Perhaps 'getting lost' in policy work might exactly be about accountability to complexity and the political value of not being so sure" (Lather, 2010, p. 16). Policymakers might begin to see their work from a different point of view.

Patti continues speaking but her attention is drawn to the back of the room. No one else seems to notice the woman standing on the very back row, in the shadows. The shadows make it very difficult to see the woman's face. It seems that Patti is the only one

in the room who can hear this woman speaking. Wait a minute, she thinks to herself—this is the woman she saw downstairs, who asked about the colored ward. Patti strains her eyes to see the woman, and strains her ears to hear what the woman is saying, although no one else seems to be able to hear her.

Henrietta Lacks: My name is Henrietta Lacks. I was known as only HeLa for almost 25 years after my death. The doctor took MY cells without MY permission. The doctors did not even tell my family that my cells were alive. Everyone thinks it is such a wonderful thing that my cells went to the moon…helped cure polio. Did anyone ever think about how my family would be impacted by my death, and then the news of my cells? Everyone thinks of me as another Baltimore housewife who died of cancer. What happened to me was wrong! What happened to my family was horrible…They scientists did nothing to help my family. *She is getting louder.*

Lather: Now calm down, there is no need to yell.

Cartwright and Blades look puzzled when Lather makes this statement.

Lacks: No reason to yell. Did my own death not silence me? Science took my voice away! Was I not silent for over 25 years while my family wondered what happened to me here…here where the night doctors would snatch people out of the streets for their "RESEARCH" (Skloot, 2010, p. 165). Those writers calling me a "monster among the Pyrex" (Landecker, 2007, p. 171). I will show them a monster. *She leaves her seat, looking around at the audience members.*

Margaret turns around and sees the woman standing, now charging toward the aisle. A security guard enters from a side door, and makes his way to the stage and whispers to Weaver.

Guard: Keep an eye out, we are trying to find a woman in a brown suit, with some kind of fancy collar. She is approximately five feet tall. We have film footage of her leaving the exhibit hall with the stolen suit. We have no film footage of her entering the hallway. We need to question her about taking the clothes from the mannequin. Keep your phone tuned in to CNN.

Weaver: (*puzzled*) CNN? Conspiracy to interrupt my session News Network?

Guard: The Cellular News Network. Here at Johns Hopkins we have our own social media for all the scientists. The patients even log on and leave DNA sequences. *He sees that Weaver is puzzled again.* You know notes, messages, and tweets. This is a science institution. We call them sequences because…

Weaver: Yeah, yeah, yeah, I get that. They teach about DNA where I come from too. This conference has been so full of interruptions. Let me get my session back on track. We will keep an eye out.

Lacks: Why did science not want anyone to know the cells came from me? Did my race keep me from getting treatment that could have saved my life? Why did the doctor take my cells without asking? Why are my children without health care? Why are corporations allowed to keep padding their pockets with profits from the sale of my cells?

Lather: Sell of your cells…that sounds funny! Sorry, I am not making fun of you. I just liked how the words sounded. Stay calm. I know you are upset. I read about it all this morning.

Henrietta temporarily fades into the shadows.

Weaver: Thanks Patti, I also want others—university professors, teachers, policymakers, government—to have a broader view of science and science education**.** We need to look at science through a lens that "embraces the ambiguous, uncertain, and infinite" (Weaver, 2001, p. 2). It is time for a science that refuses to neither adhere to traditional method, be all knowing and powerful, nor be unreachable by ordinary people. By teaching students a strict scientific method—Problem, Research, Hypothesis, Experiment, Results, and Conclusion—students get the impression that there is only one way to solve a problem. Oh, I almost forgot. The guard that just interrupted says we all (*he looks at the audience and gestures that they are part of all*) need to pull up CNN on our phones or other devices…Security is looking for a woman. There is a picture posted on the base page …can everyone see it? She is dressed in a brown suit that oddly resembles the suit taken from the mannequin in the exhibit hall. For those of you that do not know, there was an art exhibit destroyed last night when a neon sign shorted out. You all now have the link. We have to get back to our session.

Appelbaum: John, I want to interrupt here a minute. There is a press conference going on about the incident in the exhibit hall last night. I think I can pop it up on the screen for everyone to see and hear.

Weaver: We may as well take a moment and watch—this might help everyone get on the same page. Okay Peter—link us up!

The projector comes on, with the live news report.

Reporter: This is Polly Merase reporting for Cellular News Network. We are following a story in Baltimore at Johns Hopkins Hospital and Research Center. Last evening during a

thunderstorm, an electrical outage occurred, and this BioArt display was destroyed. *Cameras show a close-up of the exhibit, complete with the neon pink "Henrietta's" sign, a microscope, a beaker, a notebook, and picture of Henrietta in a brown suit.* This rather unusual exhibit consists of a bright pink neon sign and a working microscope. People viewing the artwork can actually see HeLa cells magnified 1000 times and read about the original cell donor, Henrietta Lacks. Investigators believe an electrical short from this sign caused the cells in this beaker to be spilt all over the floor. When forensic scientists arrived on the scene early this morning they reported that the original HeLa cell culture on display had disappeared. To the left of the exhibit, as you can see, we are left with an unclothed mannequin. A brown suit, vintage 1951, and brown leather sandals were removed from the mannequin. Although the investigators have positive tests for culture media, there are no positive cultures for HeLa cells. The artist reports the spilt broken beaker should have been overflowing with HeLa cells. Currently thousands of educators, professors, and scientists are gathered to celebrate HeLa cells. A woman wearing the suit and shoes was seen leaving the exhibit hall this morning around 7: 45 am. We believe this woman may have answers to our questions. Please text CNN, Cellular News Network, #HeLa, along with the information, if you see this mysterious woman, or have any information concerning this mysterious event. Meanwhile the artist, Pierre Phillipe Freymond, has refurbished the exhibit, and the exhibit hall is opened. The mannequin has been dressed in a new suit and new shoes provided by the History of Fashion museum and its curator, world-renowned fashion expert Dr. Mimi Pepys Farrell. We will continue to cover this story.

Lather: John, while we are amidst interruptions, are you going to address the questions raised by the woman in the back?

Weaver: Did someone have a question? *He shrugs his shoulder and continues when he sees Patricia Wald come into the lecture hall*. Let's all welcome Patricia Wald. (*Patricia comes down the aisle. She tells Henrietta Lacks "excuse me," as she walks by her*.)

Wald: I am so sorry to be running late. There is chaos downstairs…You would think some conspiracy is afoot to ruin our carefully planned conference**.** Missing clothes…now missing HeLa cells. CNN is getting reports that this mysterious woman in the brown suit attended a conference session this morning, and even spoke to a group of philosophers…Honestly, I don't know if the philosophers were speaking metaphorically about Henrietta Lacks or if they actually spoke to her.

Margaret slid down in her seat slightly. She was not sure if she had actually seen Henrietta either. Looking around the room nervously, she was still trying to figure out if the whole conversation that took place with Henrietta was real…or if it just happened in her head.

Wald: Let's quickly get to our topic or topics for the day. I am very happy to be here with all of you…we have important work to do concerning science and science education. I presume that I have only missed your introductions**?** And who will be taking notes to submit to the conference officials?

Blades: I will take notes. *The others smiled, happy not to have the responsibility*. Now you want a list of what we think is needed to improve science and science curriculum in schools, right?

Wald: I thank you, David. That is correct**.** Now we can move on with our discussion, without interruptions, hopefully (*she sounds unsure*). In 2008 an essay was published by a multidisciplinary group from Stanford University. This group outlined "principles designed to serve as guidelines in the debates that have surfaced with the acceleration of research in human genetic variation following the mapping of the human genome" (Wald, 2012b, p. 248). In their meeting, "They urge medical researchers to minimize their use of the categories of race and ethnicity and to be especially careful about how they explain those labels" (p. 249). I start here today because I believe that the story of Henrietta Lacks "offers important insight into the deeper issues of institutional racism that are frequently overlooked" (p. 249). This story "calls attention to social inequities that are at the center of debates surrounding health care, but it is equally relevant for the insight it can offer into the spirited debates surrounding race and DNA at present" (p. 249). Let's talk about HeLa cells first. "The HeLa cell line represented a radical breakthrough, but it also created a new organic entity—a Frankenstein's creature—for which there was no context" (p. 249).

Lacks: *Shouting*. Frankenstein's creature…Pyrex monster (Landecker, 2007)… *She gets up out of her seat and starts toward the front of the lecture hall.*

Wald: George Gey had been trying for years to grow cells outside the body. All of a sudden he had more than he knew what to do with. The creation of this cell line quickly began "exemplifying some of the ways in which scientific research was challenging conventional biological definitions of the term human being" (Wald, 2012b, p. 249). "Many involved in the HeLa research noted its resemblance to science fiction. Indeed that genre crystalized around these questions in the post war moment and offers

theoretical insight into the instability of the concept of human being" (p. 249). We have to ask…what does it mean to be human?

Lacks: Science fiction…do you think what I lived through was science fiction? *She takes the microphone out of Patricia Wald's hand.* I was just a mother, a housewife, in Baltimore, trying to raise my children. My youngest daughter, Deborah, had nightmares about me being blown up in the space shuttle. Would I be alive if I had not been treated in the public ward? *Lacks's voice gets remarkably quieter. She looks at her hands.* I died in that public ward. All this about immortal cells. I died. I died a very painful death. Now I am "Alive! Still alive. Alive again" (Butler, 1987, p. 3). How is it that I am here now walking the halls of Johns Hopkins, what else has medicine hidden from me? From my family?

Henrietta drops the microphone and looks fearfully around the auditorium. Margaret is still unable to believe her eyes. Did she actually speak with this woman during the last session? Is this woman Henrietta Lacks? What will law enforcement do to her if they find her?

Hoffen: (*Margaret reaches out and touches the hem of Henrietta's jacket and whispers,*) I know your cells have saved millions of people…you deserve to be here. You deserve the opportunity to speak…but Henrietta, you have to go. They are looking for you. You have to go hide. I will come find you later. Find a safe place.

Henrietta: I have not done anything wrong. Why are they looking for me? My cells saved humanity from polio…from cancer. Aren't they here to honor my cells? Why can't I be a part of this? I thought it was a celebration for me.

Hoffen: You are a part of this, you made all this possible. They have you confused with someone who destroyed an art exhibit last night.

Henrietta backs away and begins walking up the aisle. Again, no one seems to notice her. Wald thinks she has dropped the microphone; she reaches down and picks it up and continues speaking.

Hoffen: (*Talking quietly to herself*) Did anyone else see what I just saw? Has Henrietta Lacks been resurrected from the grave? But how? A vat of HeLa cells? From a BioArt exhibit? *Maybe her imagination was taking over. Her head was spinning. Wald continues to speak, unaware of the previous disturbance.*

Wald: As I studied HeLa cells and how they were being used in laboratories, and studied Henrietta's story, I had to ask, what exactly does it mean to be human in this scientific and technological age?

Security guards and local police burst into both sets of double doors of the lecture hall.

Hoffen: *Again muttering to herself.* Oh no, someone told them she was here. That means someone else saw her too. Or maybe this is all a conspiracy to drive me crazy.

Guard: Where is she? We got a sequence on CNN reporting that a woman in a brown suit entered this room. *The guard gets many puzzled looks. The panel is becoming annoyed with the interruptions.*

Lather: I saw the woman. She hurried out a few moments ago. I saw her downstairs this morning. She arrived when I did this morning. She asked the receptionist for directions to the public ward.

Hoffen: You mean you saw her too? Did you see her come up on the stage and take the microphone? She was very angry.

Wald: Whoa, we must continue our session. All this craziness…Took the microphone from my hand? I just dropped it. *She looks at Margaret on the front row.* Are you sure you are not seeing things? John told me earlier today that your dissertation has elements of storytelling and science fiction…Could this all be happening in your imagination?

Patti Lather looks at Margaret sympathetically. She was questioning her own sanity at the moment. If she had not been googling Henrietta on her tablet she might have seen more and confirmed the graduate student's account of Henrietta coming up to the stage and grabbing the microphone. Were two parallel universes intersecting today?

Lather: *Cheerfully*. Let us get on with our session. We will let ZNN or CNN and the local police worry about this woman walking or running around…looking like Henrietta Lacks. I am sure it is just a case of mistaken identity.

Wald: Now, back to my question: What exactly does it mean to be human in this scientific and technological age? "The creation of new and unfamiliar organic entities, such as cell lines, commingled with the haunting images of human beings stripped of their humanity to challenge in their uncanniness conventional definitions of human being and humanity" (Wald, 2012b, p. 249).

Lather: Images seem to make an imprint in our mind. Those images sometimes do haunt us. Maybe we are all seeing Henrietta's ghost. She did die right here at Johns Hopkins Hospital. Personally, I think the terms haunting or ghost could have negative connotations concerning Henrietta…I think that takes us back to Gartler's racialized

language that Hannah Landecker mentioned this morning. I think we need to return humanity to Henrietta's story. View her with a different lens. What about angel? Maybe we need to think of Henrietta as an angel—"a necessary angel" (Lather & Smithies, 1997, p. 194). "Necessary angels are about our need to create and believe in what we can hardly avoid suspecting are fictions" (p. 174). Necessary angels become witnesses, "to the human capacity to carry on and even sing in the midst of anguish, an audience of astonished angels, come down to earth to learn about living in an historical time of permanent emergency" (p. 174).

Wald: Ghost, angel…all of this unfolds like a play being performed on stage. The plot is very complex. Science has a reputation of operating on facts generated by experimental research. In so many cases the human side of the story is not cast. By having conferences such as this one, where we allow the human side of the story to enter the conversation, **"**The focus on the human drama is significant for its reminder of the importance of the human dimension of research in medicine science, and biotechnology" (Wald, 2012a, p. 249)**.** Humans in your classrooms are stakeholders. Not only in their learning, but in how they will participate in real-life, real-world science.

Blades: I think this is a good place for me to interject. The students are indeed stakeholders. Stakeholders on the bottom of the power block. I want you to think about science class from the students' point of view. Think about a student's journey as a story. Typically**,** it all begins when a young student may be asked to learn the parts of the flower using proper terminology—stamen, pistil, sepals, style, stigma, to name a few. "By the middle years of their education they can list from memory, at least before the test, the scientific plant groups" (p. 72). In high school, "students are invested in the taxonomic schemes of

botany and the biosynthetic details of photosynthesis, information they had better regurgitate for the final exam if they are to obtain the grades necessary to enter the university" (p. 72). The child does not "touch the plants," or "marvel at the struggle of a dandelion pushing through the concrete, or study the ancient use of herbs: That is not science" (p. 72). Finally, the students make it to their graduation, suffering "the terminal stages of bulimia" (p. 72). Although it may not be the most pleasant word, I think it does describe how horrible current practices in science have become from the students' point of view. "Teachers naively begin the slowly destructive bulimia of school science education by emphasizing to the children how the enterprise of science deals in facts" (p. 72). Learning should be fun…Learning should never have to be equated with a dreadful eating disorder. However, "the bulimia of science education reaches advanced stages as student's classroom experiences of science increasingly feature nice, tidy, banal experiments that have little to do with reality" (pp. 74-75). Personally, I have always been "impressed with the ability of stories to capture the attention of my students" (Blades, 1997, p. 7). I was quite taken with the story I heard from Rebecca, Hannah, and Patricia this morning. I understand Margaret's students have been quite taken with the story of Henrietta Lacks as well.

Margaret, on the front row, talking to herself under her breath, did not hear Dr. Blades mention her name.

Hoffen: She seemed pretty real to me. Let's see if I can make sense of all this craziness. So it began when HeLa cells took over the lab, years ago; Henrietta was not even mentioned. Now Henrietta is back…taking over this conference. But how? How did she get here? Maybe she never left.

Weaver interjects before Blades can repeat his question.

Weaver: Bulimia is an excellent way to describe the process, David. Students should be discussing "how scientists construct models to understand the world, and these models may produce evidence to support their usage, but they are only models or simulations, not correspondent representations" (Weaver, 2001, p. 15). With bulimia, they just spit back an interpretation of a model their teacher has explained. The only interpretation of the model they experience is the one the teacher gives them.

Appelbaum: All the emphasis on standardized testing has changed the role of the teacher. It has been my experience to find "students in science classes enhancing their propensity to interpret the world as a scientist. Instead, they spend most of their time learning to parrot already-developed techniques and applications of science" (Appelbaum, 2001, p. 114). Students should have to read, write, and think about material that they need to learn. Giving them the answers defeats that purpose. Force feeding students large amounts of information in worksheet packets to make them proficient standardized test takers is not something most students will find appealing. "Students learn best when they care about what they are learning, when what they do matters, when there is a purpose, a commitment to what they are doing" (p. 117). Oddly enough, it has to be their idea to become a part of what is offered in a classroom. If we are fortunate, enough to coerce the student into reaching out and wanting to learn new information and new skills, something wonderful occurs. A magical connection is created between students and their learning. Think of it as a bridge. However, the students must build this bridge themselves. The teacher should be cast in the role of facilitator:

> Teachers have to facilitate interaction at the frontier where information of the science disciplines intersects with understandings and experiences that individuals carry with them to school; they help students to interpret their own lives and encounter new propensities as a result of their encounter with school. (Appelbaum, 2001, p. 115).

Blades: "Forming and sharing narratives can become a call to action through a commitment to change present situations" (Blades, 1997, p. 8). This call of action involves "the individual sharing the story" and "those listening or reading the stories" (p. 8). The process directs participants to rewrite their own stories based on what they are hearing or reading. "What can emerge from such sharing of story is a conversation of critique about our normal, comfortable, and natural participation in the world" (p. 8).

Weaver: I know we each have our own stories, but do we all have an equal opportunity to write our stories? Think about this for a moment. I think we have to address that not everyone has equal opportunity when it comes to sharing, reading, and composing stories. Have you considered what might control what stories are written, told, and shared? When we talk about what it means to be human in science we must take a giant step back, all the way back to an age where humans were bought and sold. From this perspective, I am not sure we have gained any ground. HeLa cells were originally shipped to laboratories for "ten dollars plus Air Express fees" (Skloot, 2010, p. 97). In *Rolling Stone* magazine, Michael Rogers reported the cost of a "tiny glass vial of HeLa cells, to be about $25.00" (Rogers , 1976, p. 34). Henrietta's sons saw the *Rolling Stone* article. They were sure their mother's cells had been stolen and someone owed them a lot of money. Commodification of human cells…human beings. Think about that case out in California

involving John Moore and his spleen. “Dr. Gold failed to inform Moore of his intent to harvest the cancerous spleen and create immortal cell lines for further research” and probably make millions in the process. “Gold used Moore as a research object similar to the way federal scientists used African-Americans in its study of syphilis,” and the way George Gey and many, many others used the cells of Henrietta Lacks (Weaver, 2001, p. 21). Patricia, do you use the word bioslavery when you write about Moore?

Wald: Yes, John, I do. The questions raised in court in the Moore case also “haunted the Lacks case” (Wald, 2012a, p. 200).

Lather: Here we go again… using haunting and ghost like vernacular, the way teachers use battle vocabulary to discuss their jobs. Sorry, I just had to interject. Why not use a more positive term for Henrietta. We could call her a guardian angel. She is still with us. She saved so many.

Wald: The term is just stuck in my head, Patti. “Issues of who owns cells, tissues, and organs became center stage in the press when John Moore sued UCLA and the courts had to make legal sense of a cell line” (Wald, 2012a, p. 200). Let me read a little bit from a paper I wrote concerning the court case. *She removes a stapled article from her briefcase and flips over several pages before she begins reading.*

> While the Los Angeles court ruled that Moore’s cells (his discarded spleen) did not constitute personal property, and therefore that there was no case, the California court of appeal overturned the ruling on the grounds that “the essence of a property interest—the ultimate right of control—…exists with regard to one’s own human body,” although the majority opinion conceded the need to approach

> the issue "with caution," since "the evolution of civilization from slavery to freedom, from regarding people as chattels to recognition of the individual dignity of each person, necessitates prudence in attributing the qualities of property to human tissue" (Moore vs. Regents of University of California as cited byWald, 2012a, p. 200).

Then, John, comes the term "bioslavery" (Wald, 2012a, p. 200). "The term resonated in the courtroom and the press; bioethicist and legal theorists invoked it to name the danger in the Moore case as well as for biotechnology generally (p. 200). The Moore case marked the "transformation of a constellation of issues and events into a cultural narrative" (p. 200).

Appelbaum: How humans are treated by their doctors and medical science, and related issues should become part of the cultural narrative. This is an example of science and real life intersecting. "The role of culture in science pedagogy and the relationships among popular culture, everyday life, and school science should all be represented in science curriculum" (Appelbaum, 2001, p. 123).

Weaver: Skloot's book, *The Immortal Life of Henrietta Lacks*, also brings these issues of ownership, and the right to one's own body, to a cultural narrative. "Why has the history of science, like other dimensions of American history, become a tale of corporate gain? While the courts ruled that no individual could own their bodies, corporations could profit from these bodies without giving any compensation to the donor" (Weaver, 2001, p. 21).

Lather: Once commodification takes place, the people behind the science are forgotten. When I hear people talk about Henrietta, I think about the women with HIV that I wrote *Troubling the Angels* with…their "whole life gets reduced to that one thing" (Lather & Smithies, 1997, p. 9). For Henrietta, her life was reduced to HeLa cells. Her life as a real live woman was replaced with the story of the cells. "We should be uncomfortable with these issues of telling other people's stories" (p. 9). We have to get it right because they are not here to tell their version.

Appelbaum: That is a sad thing to do to students, to let commodification rob them of details that humanize science. It ignores all their valuable gifts they bring to the table/classroom. Standardized testing evaluates students "at the lowest level of human thinking—the ability to memorize and mimic behavior" (Appelbaum, 2001, p. 115).

Weaver: I want you all to think about what drives the scientists to do science. Science is kind of like teaching—monetary compensation is not the motivator. Now as far as trying to get funding for research, "monetary compensation" in the form of research grants "may play a role in the decisions scientists make regarding what type of research they do, it is not the sole or major reason innovative science is done" (Weaver, 2010, p. 22). I think that "the drive to invent and discover far outweighs any monetary desire governing the actions of scientists. Even if there were little to no monetary compensation for the scientists, much of the innovative work would still be done" (p. 22).

Researchers rely on volunteers to be research subjects. "Therefore, compensating individuals for their sacrifice and involvement in a scientific or medical experiment would not end scientific invocation" unless the "entrepreneur only has an interest in

profits from funneling money to scientific research" (p. 22). Compensation plans and the cost associated with such plans "will not stop the scientists from thinking and doing innovative work" (p. 22). Any compensation must be handled carefully. "I am not advocating a research model in which donors are compensated for stem cells, organs, or other body parts" (p. 22). We all know that if we start paying people for their cells, tissues, and organs, then we will have kids selling their organs to pay for their college.

Appelbaum: Did you hear about that kid in China who sold his kidney so he could get an iPad (Bennet-Smith, 2012)?

Lather: The news is full of stories like that. I was reading earlier today in Skloot's book that Zakariyya, Henrietta's youngest son, "realized he could become a research subject in exchange for a little money, a few meals, sometimes even a bed to sleep on" (Skloot, 2010, p. 208). When he needed something, he went over to Hopkins to see what was available. He allowed himself to be infected with malaria "when he needed to buy eyeglasses" (p. 208). I think Zakariyya's most profitable research volunteer venture involved a study concerning alcoholism. He used this money "to pay for a new job-training program" (p. 208). Once he "signed up for an AIDS study that would have let him sleep in a bed for nearly a week. He quit when the researchers started talking about injections, because he thought they'd infect him with AIDS" (p. 208).

Weaver: Henrietta did so much for science and her family cannot even afford their own medical care. This is tragic**.** What I want to propose is "an alternative to the monetary view of innovation…when someone donates a part of their—or a loved one's—body" (Weaver, 2010, p. 22). Why not have the research university, hospital, or corporation "provide

health care coverage to the donor and family for life" (p. 22). A practice such as this "would encourage people to support innovative research and help a struggling democracy overcome a health care crisis of accessibility and affordability. As it stands now, only corporations benefit from the current definition of innovation" (p. 22).

Lather: Henrietta's family would have benefited greatly from such a practice. I found it very sad in Skloot's book, when Deborah talked about the family not being able to afford health care.

Blades: John Moore would have benefited as well. The ethical issues in each of these situations are very complex. Once a consent form is signed, all the responsibility reverts back to the patient. That is, if a consent form is even part of the process.

Weaver: Priscilla, I want to go back to your mention of Henrietta as a Frankenstein creature.

Margaret cringed on the front row. This is what had upset Henrietta earlier. Where did she go?

Weaver: As Priscilla said earlier, with the creation of a cell line from Henrietta's cells, a new entity rises. This new thing complicates matters. What does this new thing mean for science? Sometimes I think we forget that new scientific knowledge can be created. I hope no one is taking the term Frankenstein's creature to mean that Henrietta is a monster. I am using monster to mean…something new… something that is difficult to explain. Mary Shelley created *Frankenstein* in order to "tell a monstrous tale of science and education" (Weaver, 2010, p. 35). Shelley's vision of education "fosters an instrumental approach to education in which students at all levels are reduced to test taker and job seeking, proto-consumer while the fostering of the imaginative mind is neglected" (p. 35). Does that not sound hauntingly familiar? We are cranking out test takers each day.

Cartwright: How often do we take standardized tests as adults? Not a lot of real-life application.

Weaver: Are all of you familiar with Shelley's story, *Frankenstein*? Did you know it was about education…and not just a monster? *He looks out toward the audience.* Well, the creature…the creation... "over-reached the human boundaries that separated humanity from the dangerous forces of nature" (Weaver, 2010, p. 35). Henrietta is part of a story that does at times seem like science fiction. When Henrietta was given immortal life through her HeLa cells a boundary was crossed. Henrietta is immortal through her cells. Her cells make her posthuman. "At the core the posthuman condition implies the merging of humans and machines in order to enhance or improve human capabilities" (p. 11). Cells removed from Henrietta's body were kept alive through techniques developed to grow cells outside the body. Those techniques along with George Gey's "roller tube" technology created the possibility for Henrietta to enter the post human realm (Landecker, 2007, p. 112).

Mary Shelley's work allows for an opportunity for us to contemplate understandings of science and education. I think the story of Henrietta's immortal cells can have a similar application. "Traditionally, scientists and science teachers see little value in understanding or studying the past. The only thing that matters is the present state of theory and practice within the natural sciences" (Weaver, 2010, p. 38). Why study history in science class?

> The history of science, for Shelley and most scientists, then is a waste of time, a luxury of time but not a necessity for conducting responsible science. Most importantly for Mary Shelley, the history of science is dangerous. Only

> contemporary science is enlightened and the type of science necessary to create scholar scientists while the past only hides dark secrets that are better left buried in time. (Weaver, 2010, p. 38)

What if Henrietta's story had remained buried? Instead, her story was resurrected. Mary Shelley ends her tale of Frankenstein with a cliff hanger. We don't know if the monster lives or dies (Shelley, 1996). Today we are all wondering what happened to Henrietta. Can we tell this same tale, with Henrietta Lacks being the main character? Everything comes down to what stories can do for science and teaching…And here we have our own story that has been unfolding all day.

Appelbaum: Speaking of our story, I think the CNN has an update. I am going to put it up on the screen.

Polly Merase: This is Polly Merase for the Cellular News Network, reporting live at The World Alliance of Science and Science Education. After a day of excitement at Johns Hopkins University, there seems to be no sign of a person thought to be impersonating Henrietta Lacks. The BioArt exhibit was destroyed and a wax mannequin of Henrietta was stripped of clothing. Multiple reports of a woman entering lecture halls and entering discussions with scientists and curriculum theorists are surfacing as we continue to investigate this story. Many report they are not sure what they saw today. As we weave this story together, we know one thing…there is no trace of Henrietta Lacks here in this exhibit hall…Scientists on staff here say it is amazing that every cell from the art exhibit is missing. Considering HeLa's contamination history, there should be HeLa cells growing all over the exhibit hall. We will keep you posted on this story.

Enter Hannah Landecker, carrying a piece of paper in one hand and her tablet in the other.

Wald: Hi Hannah, I had almost given up on you.

Landecker: I am so sorry I did not get here sooner. Today has been very chaotic. Supporters of chaos theory in education should be reveling in seeing how our conference on science education is playing out. I have with me the list created in the philosophy session this morning. The note taker titled this…"What Science Education Needs." I thought you university professors would like to see this. Education often looks to researchers at the university level to introduce pedagogy that ascribes to current and past philosophies in education. I will just read it out loud. I am very curious to see if you all have discussed any of these issues. Who is keeping the list for this session?

Blades: No worries, Hannah, I have been quietly keeping notes. Let's see how they compare.

Landecker: Okay, here goes:

1. Basic laboratory skills of inquiry/not strict method

Cartwright: Put a check by that one. We discussed the scientific method being too confining. This is definitely a problem in physics.

Blades: In biological science, teachers often have students repeat experiments with confined endings. Students need more opportunities to inquire and know they can create new knowledge.

Landecker: Sounds good. What about

2. Science experimenting with possible open ended outcomes. Then add connections to real life, including economics?

Weaver: Commodification of humans, human cells, and human organs…check. Maybe put two checks. So much of science policy and scientific research rests in the power of those who hold the money.

Landecker:

3. Science connections to culture
4. Science connections to humanity

Lather: We have to remember that all the stakeholders in science are human, and we must make sure we take care when telling their stories.

Landecker:

5. Science connections to other subjects (Interdisiplinarity…history, humanities, mathematics, anthropology, sociology, political science, and more)

Appelbaum: I would think Bruno Latour would be very happy to see such an interdisciplinary science. "Science pedagogy should pay attention to the importance of relationships among science, technology, society, and human values, and the importance of discourse and communities of inquiry in the classroom" (Appelbaum, 2001, p. 113).

Landecker:

6. Science connections to constant change
7. Science from a feminist perspective

Weaver: By working to include a feminist perspective in science, students of science see science "[constructing] a world where the knowledge [of women] and [their] experiences are

valued" (Weaver, Anijar, & Daspit, 2004, p. 34). "Women give legitimacy to alternative ways of knowing" (p. 34).

Lather:

8. Science is not just for scientists, it must include all participants
9. Science must incorporate discourse in order to solve problems

The entire panel continues to nod as she proceeds through the list.

Blades: So far, so good.

Landecker: And finally, yet importantly, the group made a unanimous decision that Henrietta Lacks should be number ten.

Weaver: They actually put Henrietta on the list? Don't get me wrong, I have no problem with it…but I thought my own bias about her being included in science might be limited to a smaller audience. And the philosophers added Henrietta. Not much of a surprise if you really think about it. Science and science education need to value all its participants. *He notices that Margaret looks as if she wants to speak.* Margaret, did you want to add something?

Hoffen: I have often wanted to ask if you thought Henrietta could be accepted in a posthuman world. We all know she was an outcast in terms of humanism. With all of our discussion today it sounds like Henrietta has been invited into the house. John, remember how you used "Toni Morrison's imagery of Jacob's empty brick house in *A Mercy* to suggest we do not know who will count as posthuman" (Weaver, 2015, p. 182)? Morrison told the story to describe "that no matter how different Jacob and his progeny were from the

D'Ortegas of the world, humans were still unfit to dwell in the home fit for the cultured and civilized" (Weaver, 2010, p. 182). Philosophers and curriculum theorists have included Henrietta in the conversation today, but what about the rest of the world? What about humanity as a whole? You tell us that humanity is "not fit to inhabit a posthuman world because we are still too barbaric toward one another selling everything for the right price" (Weaver, 2015, p. 182). Academic meetings of like minds can be like mountaintop religious experiences. We are all celebrating Henrietta Lacks here, in this place and time—all likeminded. Nevertheless, just as Jacob was unfit to abide in the house, I worry that science will continue to see Henrietta as unfit to dwell in science classrooms, as herself.

Weaver: I have to go back to Toni Morrison myself to respond. I can see a resemblance to Henrietta in the closing of Morrison's book:

> I am holding a light in one hand and carving letters with the other. My arms ache but I have need to tell you this. I cannot tell anyone but you. I am near the door and at the closing now. What will I do with my nights when the telling stops? (Morrison, 2008, p. 189)

Henrietta will only be known if her story is told. In order for her to dwell in those science classrooms, her story must be told.

Blades: Telling the story of Henrietta in those science classrooms will make Henrietta immortal, just as her HeLa cells are immortal. Could this possibly lead to an immortal love for learning?

Appelbaum: I want to assure everyone that I am all for Henrietta becoming as immortal as her cells. I think for those who are outside of this circle, we have to make sure we frame our work in a manner that it will be suitable to a very large audience. We have to make sure everyone understands how this story will be applied as alternative pedagogy in classrooms. I want to emphasize a few guidelines to make sure there is no confusion:

> In the alternative pedagogy, we search for an intimate knowledge of what interests our students bring to the classroom; these interests are the grounding of science as practice. New questions emerge. As they surface and flutter we express anguish: that these new questions keep in mind the old ones and avoid a repetitive competition for rightness in favor of a dialogue about efficacy. In this dialogue we hope for attention to the conflicts that we have identified in contemporary discourse and practice. (Appelbaum & Clark, 2010, p. 597)

Weaver: We all know that we cannot reduce everything science needs down to a Letterman Top 10 list. If we are able to change the thinking and "break the grip of those stifling binaries that infest the minds of traditional enlightened science, we can create dynamic classrooms that turn science into a process of discovery and intellectual debate rather than a process of replication and rote memorization" (Weaver, 2001, p. 21).

Appelbaum: One other concern. Should Henrietta Lacks be the only name on this list? Don't get me wrong. In this time and place it seems to make sense to add Henrietta. Let me assure you I am well in favor of adding Henrietta. However, there are many others that need to be included as well. I suggest a wording change. Maybe say—Henrietta Lacks, her story, and the stories of unknown others?

Lather: That opens up the boundaries. This wording ensures other opportunities for discourse to be introduced in the classroom.

Appelbaum: David you used the word critique a few moments ago. I think we must continually critique "the narratives that are presented in school science" (Appelbaum, 2001, p. 125). We should also teach this critique process to our students. There are several questions that we must ask continually when evaluating what stories can become part of science:

1. Who benefits from this version of the story?
2. Whose prior knowledge and cultural experiences are best matched to the most important principles of the lesson? And whose are excluded?
3. How will I get students to ask and answer these questions themselves?
4. What (community) action projects will ask students to participate in local political processes? (Appelbaum, 2001, p. 125)

With these goals in place, we take a story to a new level. A third space for discourse is created.

Blades: Two groups, two different rooms…and I think we have mentioned all of these in our discussion.

Weaver: We have not said much about power. Maybe some of these ideas need to be made more specific in their relationship to power. "At its heart, science education is not only about the teaching of science but the complexity of knowledge" (Weaver, 2001, p. 17). (*He looks toward his graduate student Margaret and speaks to her directly.*) Margaret, you look like you want to add something.

Hoffen: As soon as you said complexity of knowledge…I wanted to say— Complexity in spite of policymakers reducing science to simplistic shopping lists of standards! Complexity in spite of educators being viewed as technicians and robots. A list is okay if it is just used as a guideline. However, the current measuring stick for success in science is based on the student's ability to regurgitate the information. "Bulimia," as Dr. Blades said earlier (Blades, p. 71). Predetermined standards and predetermined outcomes.

Weaver: I agree that science has too many boundaries. Simplified science reduces opportunity for change. "Complexity of knowledge and life and the importance of making sound public policy decisions that are not done for ideological or profit motives but for sustaining of a quality of life" (Weaver, 2001, p. 17). Now to create a "viable alternative to traditional enlightened science, [we] will have to invent a pedagogy that offers alternative ways of seeing nature, science, and the world" (p. 17).

Blades: We have contributed to a rather sizable discussion concerning pedagogy. It is interesting to me that they all involve stories of some genre. Through science fiction, allegory, fables, nonfiction… science can be expanded. Introducing stories to science provides connections that allow students to see science together with other disciplines such as literature, economics. When students see science connected to real life situations they can form their own critiques. They may see or suggest that science and science education need to change.

Lather: I think it is rather poetic that we are having this discourse in the midst of a story unfolding—a story within a story. Do we know what happened to Henrietta? Was

Henrietta really here at Johns Hopkins—walking around the meeting? Who was that person in the lobby asking for directions to the public ward?

Cartwright: Henrietta walking around the meeting is not the only story on the table today. Let us not forget the stories that we bring to the table today. Stories that tell of our unusual encounters on the way to this meeting. They definitely seem of the supernatural sort…not anything that can be explained by physics.

Weaver, Blades and Appelbaum hum the theme to The Twilight Zone.

Cartwright: (*smiling*) "What we need to understand in order to understand the way scientific laws fit the world, it is the relationship of the abstract to the concrete, and to understand that, it will help to think about fables and their morals" (Cartwright, 1999, p. 36). If we really want people to understand the complexities of science, we must attach the science to something that an individual can relate too. "Fables transform the abstract into the concrete and in so doing, I claim they function like models in physics" (p. 36). I have a question. I want to ask if the "relationship between the moral and the fable is like that between a scientific law and a model. If they only apply in very special circumstances, then perhaps they are true just where we see them operating successfully, in the artificial environment of our laboratories, our high-tech firms, or our hospitals" (pp. 36-37). Personally, "I welcome this possible reduction in their domain, but the fundamentalist will not" (p. 37). If not fables and morals, how about considering the use of allegory? "Allegories say not what their words seem to say, but rather something similar" (p. 39).

Blades: "Allegories are a method of presentation in which an idea, person, or event stands for itself and /or something else" (Blades D. W., 1997, p. 128). "Allegories have provided

throughout time a way for authors to introduce critique to discourse while avoiding premature closure of meaning" (p. 128). Some of your journeys to this meeting were spectacular. "Think about the exploits of Don Quixote, discoveries of Gulliver, Christian's journey as a pilgrim or obsession of Ahab to find the Great Whale are but a few of the masterful allegories used by authors to present the public an invitation to discuss something else" (p. 21). Although *The Immortal Life of Henrietta Lacks* is not an allegory, the same purpose is fulfilled. This book a wonderful example of an author presenting the public with an invitation to discussion; Skloot invites all the readers to participate in discussions about racism, sexism, segregation, economics, and ethics, just to name a few.

Lather: Struggle is a common theme. Allegory allows us to tell a story privately. An allegory "can speak quietly, with respect for all that it means to tell the stories of people…without making a spectacle" of their private struggles (Lather & Smithies, 1997, p. xiii).

Weaver: I agree that allegories have a definite place for creating discourse in any setting. One could say the same thing about science fiction. If one were reading Rebecca Skloot's book, out of context, one might think it is science fiction…immortal cells, cell lines, cells going to the moon. As curriculum theorists and educators, science fiction allows us to "push boundaries" (Weaver & Anijar, 2001, p. 15). Science fiction can become "our central metaphor, negotiating previously uncharted territory to reconceptualize epistemological, axiological, and ontological constructions" (p. 15). Science fiction allows "teachers and students to speak on their own terms" and break away from "the strict codes" created by academia and government (p. 15). Today's events definitely all

have elements of science fiction. Do any of you think Henrietta could have risen up from the vat of HeLa cells? I know Margaret is thinking that…

Appelbaum: That is an idea we should entertain, if we are going to be the open-minded curriculum theorists that we are.

Weaver: Let's say it did happen…Our Frankenstein creature Henrietta is really here walking the halls of Johns Hopkins again. Where would she go?

Hoffen: She would have to find somewhere safe, some place she was accepted, a place where people believed that she was real, and felt that she deserved to be treated with respect. She could come home with me. My school has been nicknamed the Henrietta Lacks School in our district of six high schools. The students in my school would accept her. The students talk about her each year when we celebrate her life.

Wald: Like I said before Margaret, you have some kind of imagination! Please let me know if you find Henrietta. As we close today, I must say that this has been a most excellent session. I am glad there are others that have to carry the responsibility of finding the woman who has haunted our proceedings today.

Landecker: It seems ironic to me that "cell lines are made to stand in for persons in the first place; they function in laboratories as proxy theaters of experimentation for intact living bodies" (Landecker, 2007, p. 54)**.** Now we may actually have seen that in reverse…a real live woman… resurrected from the cell line, representing her cell line in our sessions.

Wald: Margaret, I think your imagination is wearing off on Hannah!

Stage goes black.

Postscript: Characteristics of Alternative Pedagogies

As a science educator in today's public schools, teaching a standardized curriculum, I want to take the basic required curriculum and expand it so that it "allows for a multiplicity of possibilities and alternative pedagogies" (Weaver, 2001, p. 20). Weaver suggests that all teachers must switch the dial from the required process of rote memorization to a "process of discovery and intellectual debate" (p. 20). Too many times teachers are simply the givers of answers in order to expedite teaching and gain results expected by the state or district office. In an age of accountability for teachers, brought about originally by No Child Left Behind, and now Race to the Top and Teacher Keys Evaluation System, teachers have been forced to focus their instruction on standardized testing. Standardized tests are used to evaluate teacher performance, as well as student performance. Test review becomes a priority in classrooms. With added time devoted to test review, and mandated benchmarking, material is condensed in a manner that assures objectives are taught in a condensed manner. Teachers in my building report a decreased amount of time for instruction that emphasizes critical thinking and even time for laboratory exercises[8]. Gayler (2005) looks at standardized testing specifically in Maryland and Virginia. In these two states "teachers have revised their instruction to emphasize topics and skills likely to be tested and to spend more time on reviewing information and test-taking skills" (p, 4). He goes on to say that students and teachers report "that instruction has become too focused on reviewing discrete facts, with little time for discussion, and in-depth-learning or creative lessons" (p. 4). In such a setting it is the "students [that] are being left behind as teachers push ahead to cover all the topics on district curriculum maps and pacing guides" (Gayler, 2005), p. 4)

[8] See Heese (2015) for a thorough literature review concerning consequences of high-stakes testing.

Good teachers will prepare the students for the mandatory testing. Regardless of whether or not we agree with this policy, we want our students to be successful on these mandatory standardized assessments. The assessments influence their grade, and at the high school level, grades impact students' futures.

It is a bit of a juggling act in my classroom to make sure standards are being taught at a level that requires critical thinking, and at a level where inquiry and learning to ask questions is the focus. Having the ability to take a standardized test does have some merit. High school students take SAT's and ACT's in order to get into college. High school students take the ASVAB in order to gain entrance into the military. Eventually we hope many students will sit for licensing exams in fields of medicine, nursing, teaching, plumbing, electrical work, cosmetology, and many others. In our day-to-day lives these testing opportunities do not have much application. I have not taken a standardized test since I took the Graduate Record Exam to gain entrance into my doctoral program. In my classroom this past spring, during a six-week period, some students endured over 17 different standardized assessments. Each advanced placement class requires an SLO exam, a teacher-made final exam, and the College Board Advanced placement test. The exhaustion was obvious in their demeanors, and their physical well-being.

Time in science class should not focus on testing alone. Science curriculum should be rich with philosophy of science, history of science, activities that involve inquiry, and stories. Students can use stories to relate their results and a new way of thinking with familiar information and prior knowledge, essentially bridging the gap between the known and the unknown. Boundaries of science should be expanded to include all participants—those researching and creating new knowledge in science and those impacted by this new knowledge. Can we begin by removing science and scientists from the pedestal upon which they were placed

during the Age of Enlightenment? Weaver (2001) tells us that we as a society can no longer "shroud science behind a cloth of god-like importance and ability" (p. 6). Weaver (2001) also tells us that "the notion that the public is too ignorant to understand and take part in major scientific policy and decisions" must end (p. 17). Too often students of science think that science is out of their reach, yet we all use science in informal ways. For example, one might observe that he or she is not sleeping well on Thursday night. Upon further reflection and a quick trip to google the caffeine content of Starbucks coffee, one might discover that the cup of decaffeinated Starbucks coffee consumed while picking up a few groceries after work might contain enough caffeine to disrupt sleep. Science is experienced daily, from our observations to the medications we take to control our allergies or high blood pressure. We know that beyond standardization, science education must be socially and culturally relevant.

"Socially relevant science education was promoted in one form or another by most science education leaders during the first half of the twentieth century with calls for scientific literacy and with the creation of a science-technology-society approach" (Deboer, 1991, p. 234). "It is curious then, that science educators have had such a difficult time convincing classroom teachers of the merits of a socially relevant approach" (p. 234). Teachers from the early twentieth century tended to spend too much time "on the study of science for 'its own sake' and not enough time on socially relevant themes" (p. 234), a practice continued by present-day teachers. Deboer (1991) presents three reasons to support teaching socially relevant science. "The first is that by teaching science in the context of what is already familiar from daily experience—newspaper, television, and magazine accounts of nuclear power plants, environmental pollution, recycling and the ozone layer, for example, or about objects in and around the house such as electronic devices, the automobile, and household appliances—the student is motivated to learn

the science that relates to those daily experiences" (p. 235). The curriculum becomes connected to the student.

When science is relevant, "worthwhile outcomes result" (Barton, Ermer, Burkett, & Osborne, 2003, p. 118). These authors report that

> Students of science begin to recognize and exercise their voice and autonomy; they learn to become agents of change in their own lives and within the disciplines of science, using their authority to challenge the traditional cultural practices of science and education. (Barton, Ermer, Burkett, & Osborne, 2003, p. 118)

When learning experiences make a connection with the student or the student culture, the information becomes part of the student. "Resonant learning experiences are meaningful and empowering"….by creating, while "responding to their own questions and needs, science takes on a personal relevance that is not something that had to be learned for a test or project" (Barton, Ermer, Burkett, & Osborne, 2003, p. 118). Students intersect with science on multiple levels: "Power, access to knowledge, equity, social justice, and culture play a role in how youth experience science, but also in how youth respond to difficult situations in order to create a practice of science that has power and meaning in their lives" (p. 158). The intersections become part of their life, their story. "Stories help us understand how science, schooling, and society might intersect in science education settings to help build a more socially just, critically informed, and sustainable society" (p. 158).

Deboer traces science education from the early eighteenth century to the late twentieth century. Over time, social relevance has gained ground over traditional rote memorization.

Deboer (1991) tells us “the true purpose of education was to prepare people to deal with …socially relevant questions—to equip them for the age in which they live” (p. 3) He tells us that if we look and “see what has been lost and gained by each major shift in the past,” we can “head with greater vigor in the direction of social responsibility and socially relevant instruction in science” (p. xii). In the next chapter we will see how students perceive the story of Henrietta Lacks. In Act VIII we will hear student conversations about Henrietta’s story and here their responses.

CHAPTER SEVEN

THEORY MEETS PRACTICE

Deborah Lacks and HeLa Cells

On May 11, 2001, Henrietta's daughter Deborah, and her brother Zakariyya, met Rebecca Skloot at Johns Hopkins hospital. Today was the day they would see their mother's HeLa cells for the very first time. Their other two brothers could not make the meeting. One was working and the other one was going to see a lawyer about suing Johns Hopkins. Rebecca, Deborah, and Zakariyya would be visiting the laboratory of Christoph Lengauer. The scientist met them in the lobby with a smile and outstretched hand, wearing blue jeans and a plaid shirt. Looking at Deborah, He said, "It must be pretty hard for you to come into a lab at Hopkins after what you have been through. I'm really glad to see you here" (Skloot, 2010, p. 261). He explained that they would start in the freezer room, so he could show the group how Henrietta's cells were stored, and then he wanted them to see the cells under a microscope. Christoph opened the freezer. Deborah was in awe that she was finally face to face with her mother's cells. Zakariyya was very quiet. Christoph showed the group a vial full of red liquid and complete with the "letters H-e-L-a written on its side" (p. 262). Christoph explained that each vile contained millions of cells. As long as the cells stayed in the freezer they could be thawed out to start growing again. He told them that the cells could stay in the freezer forever. "Fifty years, a hundred years, even more—then you just thaw them out and they grow" (p. 262). Growing cells in a laboratory is strictly science. Right?

Christoph Lengauer's research centered on HeLa cells. He became very passionate about Henrietta's story after reading an article that Skloot wrote for *Johns Hopkins Magazine.*

Christoph worked with "florescence in situ hybridization." FISH allows a technician to "paint chromosomes with multicolored florescent dyes that shine bright under ultraviolet light. To the trained eye, FISH can uncover detailed information about a person's DNA. To the untrained eye, it simply creates a beautiful mosaic of colored chromosomes" (p. 234). When Christoph learned about Henrietta's story, he framed Deborah one of his HeLa cell paintings. "It looked like a photograph of a night sky filled with multicolored fireflies flowing red, blue, yellow, green, purple, and turquoise" (p. 234). Christoph sent the print to Rebecca Skloot. Rebecca presented the print to Deborah when they met for the visit to Hopkins. Christoph opened his laboratory door and allowed Henrietta's family to enter. A space was created between the science of HeLa cells and the real people involved in the story, Henrietta's family. A new story evolved. Christoph reached out and Deborah gained learning and understanding about her mother's famous cells that had eluded her throughout her entire life.

This excerpt of the story from *The Immortal Life of Henrietta Lacks* is a wonderful example of curriculum in the making. As I read about Deborah, Henrietta's youngest daughter, I quickly noticed that she is a self-motivated learner. She spent all of her life teaching herself about cells. She would ask questions. She would read anything she could find about her mother's cells. Real-life experience provides the spark that can make a school curriculum come to life. By adding personal experiences with science as common ground for discussion, all stakeholders can become part of the conspiracy that can enhance a standardized curriculum.

Act VII: Theory Meets Practice

Characters in order of appearance: Dr. Angela Calabrese Barton, professor; Ms. Krystal Sonnenschein, the school receptionist; Alexis, high school student; Lydia, high school student; Margaret Hoffen, teacher/graduate student; Dr. Ming Fang He, professor; Delores Pequod, high

school science teacher; Dr. William Schubert, professor; Dr. William Doll, professor; Dr. Madeleine Grumet, professor; Dr. Joseph Schwab, professor; Dr. John Weaver, professor; Jhaymia and Kyle, high school students; Mrs. Robinson, high school teacher; Charles, high school student

The action has moved from the meeting at Johns Hopkins to a large suburban high school in the southeastern United States**.** A meeting is taking place. University professors are meeting with two science educators to discuss the current state of science curriculum at this particular school. The discussion will examine three topics: Relationships, discourse, and what happens in spaces of transformation. Are relationships between teachers, students, and curriculum necessary in science education? Can storytelling create the discourse needed to help students find their role in science and society? Can storytelling create a bridge necessary to allow students of science to become connected to the science curriculum?

Angela Calabrese Barton navigated her rental car through the packed school parking lot. She had not imagined that a small southern town could have as much traffic as a Chicago city street. She entered the double doors and walked to the reception window to the right. Coming into school, she notices the entire entryway is covered with posters that say—Wear Red October 4 to Honor Henrietta Lacks—in large print. She looks down at her blue printed blouse and navy blue suit. The receptionist behind the window is wearing a bright red suit shirt and shiny red Mardi gras beads. Attached to her name tag is a sticker that appears to be a miniature version of a book jacket.

Barton: Hi, is it Ms. Sonnenschein? What does your sticker say?

Sonnenschein: Yes, you did well with that. But, please just call me Krystal. The sticker is the book jacket for *The Immortal Life of Henrietta Lacks.* You know, the 2010 best-seller written by Rebecca Skloot. It was one of Oprah's book club books a few years ago. Our biology students read this book when they study cells. We have this special Wear Red Day each year to celebrate the life of Henrietta Lacks.

Barton had heard of the book. She was pleased to see this receptionist so excited about the story. The receptionist smiles, hands Barton a yellow visitor sticker, and gives her directions to the Media Center conference room. As she enters the school commons area, she hears music—a Duke Ellington tune. The visitor is surprised to see that a group of students is performing the music. Their leader is waving a baton and tapping his foot enthusiastically. She sees a booth set up close to the Media Center door: the location of her meeting. Everyone in the booth is wearing red t-shirts that say— Not just HeLa—Henrietta Lacks. They are stacking up bookmarks, untangling red beads, and positioning red balloons. A young woman named Alexis approaches Barton.

Alexis: Would you like some beads? I can give you some as long as you are willing to explain why you are wearing them.

Barton: Sure, I will take some beads. I guess if I like what you tell me, I might be willing to share it with someone else.

Alexis: *The young African-American girl is talking a million miles an hour.* Well it started when our teacher told us that cytoplasm is as busy as a New York City street. She read to us from this book. *The young woman hands Barton a copy of* The Immortal Life of Henrietta Lacks. *Her voice starts to calm as she gets into the story.* Now remember, this

was in 1951, when women were nobody, and black women were even less than nobody. Henrietta Lacks had to go to the Johns Hopkins Hospital; any other hospital would have let her die in the parking lot because she was a Black woman. The doctors found out she had cervical cancer. When they removed the tumor, a woman named Mary from the lab came up to the operating room and took some of the tumor cells. It was her job to try to grow the cells. No one had ever been able to grow cells outside the body.

Barton: I am just curious, how did you learn so much about this story?

Lydia: Our teacher has us research the story and find a part of the story that we feel is important. We have to create a product to tell the part of Henrietta's story that we picked. We also have to think about how that part of the story is important to science. Here comes our teacher now. Mrs. Hoffen. *She calls to the teacher and begins to wave.*

Hoffen: Good morning to you too, Lydia. Hi, Alexis. Dr. Barton, welcome, I am Margaret Hoffen. I was part of a Skype lecture you participated in during my coursework at the university. I think our meeting is right through here.

Alexis: Okay, Mrs. Hoffen. It was so nice to meet you, Dr. Barton. I thought you were one of our special guests here for our Henrietta Lacks Cell-e-bration…Get it…Cell...Cell…like the cells in your body.

Hoffen: Alexis, we will be Cell-e-brating with you after our meeting. Dr. Barton, you can go on to the meeting. I will join the group in just a few minutes.

Mrs. Hoffen decides to check on the jazz band before she goes in for the meeting…too much going on in one day. Dr. Barton finds the room without any problems. She is greeted by Dr. Ming Fang He.

He: Hello Angie, come in, we will get started as soon as Margaret arrives.

Barton: Hi Ming Fang. It is so nice to see you again.

He: Thank you both so much for volunteering to be part of this conversation. Can you remind me of your name?

Pequod: Pequod, Delores Pequod.

He: Your entire science department seems very enthusiastic about developing a program to bridge the gap between educational theory and teaching practice. As educational researchers we need to see if our theoretical perspectives can be applied to actual classrooms. I am so excited that you want to be a part of this experiment of sorts, Mrs. Pequod. If your school is chosen to participate in this program, our institution will send preservice teachers here for training.

Pequod: Wait a minute. You think I want to be part of this theory meets practice research project? Do you think I was collaborating with her, Hoffen, to bring you to our school? Ha…you are way off. I was sent here by my department head to observe. I am on a recon mission to ensure that our school mission plan is kept intact. Theory…university professors…have you people ever been in a high school classroom? *She speaks very gruffly to the group.* I want to make sure you understand that we do not want to be part of your program. Our school is fine just like it is. I don't know what she was thinking when

she replied to your request for volunteers... We the practicing teachers should be the ones telling you university types about theory. Since she is not here, we can all leave and put an end to all this nonsense of needing change.

Mrs. Hoffen rushes into the room dressed in red from head to her brightly painted red toenails rushes into the room. She has Mardi gras beads around her neck and a Wear Red to Honor Henrietta Lacks sticker on her lapel.

Hoffen: Hello everyone, I am sorry I am running late. My students stopped me in the hallway. I had to check on the jazz band. The students are so excited about our Wear Red to Honor Henrietta Lacks event. I am juggling a few more plates than usual this morning.

He: We are so glad you are here. We were excited to learn that our meeting would be held on the same day as your event. We want to see what this Wear Red Day is all about. Our panel is hoping to see the event up close and personal. Maybe see some real-life examples of educational theory meeting educational practice. *She smiles across the table at Mrs. Pequod.*

Hoffen: Wonderful. Feel free to have some lunch, enjoy the music, and then attend our program in the auditorium. It begins at 1: 00. Mrs. Pequod, I do hope you bring your classes today.

Pequod: Are you kidding? We have to put the final touches on our nine week's benchmark, and post the grades.

He: What is a benchmark?

Pequod: A benchmark is a district-wide assessment given at the end of each grading period.

He: Kind of like a nine weeks test?

Pequod: No, no, it is not a nine weeks test. We do give nine weeks tests that are made by classroom teachers. The benchmark is a test based on specific standards that were supposed to be covered during a specific time period according to the district curriculum map. It is made by a county level committee outside of the school. It does not count for a grade. Teachers must give the test at an assigned time. We have a narrow window to submit our results. That is why I need to be in my room today!

He: So your students take a test, made by someone who is not aware of what is going on in your classroom, and the test does not count for a grade. What is the purpose of this test? Why put the students through both a benchmark and a nine weeks test?

Pequod: You research types should appreciate this kind of test. It is all about data collection. The benchmark test is used to collect data for teacher evaluations.

He: So a test created by someone other than a child's teacher. This test is given to students on a day predetermined by someone other than a child's teacher. The test does not count as a grade and it is going to be used to grade teacher performance. How do you get the students to take such a test seriously?

Hoffen: Some students take the test seriously, others don't. We search for ways to bribe them into taking it seriously. She did not mention that it uses up an entire class period of instruction. Three days of instruction during the school year, and additional time if a teacher choses to discuss the results of the test and give students feedback. She also did not mention that sometimes the questions do not match up to the curriculum that has been taught. She also did not mention that the test questions are generated by a computer program that our district spent a lot of money on, so they will not change how the tests

are made. The effort put into the test and the data obtained from the test is totally useless. Can we move on? The entire process depresses me beyond imagination.

He: Certainly. Let's begin with our introductions. I am Ming Fang He and this is the very lovely and brilliant Dr. Angela Calabrese Barton. I have gathered a team of additional experts to join us via Skype. Can you hear me? *Dr. He gets the projector started. The group at the school can now see a group of men seated at a table.* Good morning everyone! How are you all?

Schubert: Hi Ming Fang, Let me introduce our group. I am William Schubert. This is William Doll and Joseph Schwab. Madeleine Grumet will be joining us momentarily.

He: I think everyone needs to share a little about him or herself. Then we can get started with our discussion. I will go first. I am a professor at the University here in town. I teach in the Curriculum Studies program. My work concerns navigating the in-between. I am also an activist for social justice in education.

Barton: Angie Barton here. I am a science educator. I am interested in social justice as well. I want to see science taught in a manner that involves social justice, democracy, and human rights. Science education should be democratic. Students should see how their science education is relevant to society. When we work with students to "create relevant science, many worthwhile outcomes result" (Barton, Ermer, Burkett, & Osborne, 2003, p. 118). I also hope we have time to talk about equity in providing science education to all of our students.

Pequod: Excuse me but I must protest. Science has nothing to do with justice, democracy, or human rights. Science is the pursuit of truth and understanding through a trial of experimentation and verifiable and repeatable results.

Hoffen: *Shaking her head side to side.* We will get to that in a moment, Delores. I believe it is my turn to introduce myself. My name is Margaret Hoffen. I am a teacher here. I have taught students science for over 24 years. I am so happy that you get to be here. I wish your sole purpose of attendance today was to help us celebrate the life of Henrietta Lacks. I am not sure how familiar you all are with the story of Henrietta Lacks. I hope you have all read the book.

He: It is exciting. I passed your booth on the way in. The music is fantastic. I am just curious. Why did you pick jazz music for the event?

Hoffen: Henrietta and her sisters would all get together and dance to jazz music on Saturday nights. They loved the tunes of Benny Goodman, Louis Armstrong, and Billie Holiday. They would move all the furniture out of the living room and onto the lawn and dance until dawn inside the house. That is why we have jazz music today. *She looks at Mrs. Pequod and smiles.*

Pequod: You just go on and on don't you. I probably have 50 emails about her HeLa day on my computer right now.

Hoffen: Henrietta Lacks Day. She was not just HeLa. She is a real woman.

He: Let's continue with our introductions

Pequod: I am Delores Pequod. I have 29 years in and I will be surprised if I make it to the 30-year mark. I teach whatever curriculum they tell me… There is no time for your stories or jazz (*she glares at Mrs. Hoffen*). We have standards to teach, a curriculum map to follow, and benchmarks to give.

Mrs. Hoffen takes a deep breath. In order to change the mood, the first Skype participant introduces himself quickly and cheerfully.

Schubert: Good morning! I think it is my turn. Again, my name is Bill Schubert. Our meeting today is an opportunity to look at spaces that can be created when theory and practice meet. I am confident that in these new spaces an innovative curriculum can evolve. We teachers must continually ask our students and ourselves what knowledge is worthwhile. "What is worth knowing, needing, experiencing, doing, being, becoming, sharing, contributing, and wondering?" (Schubert, 2009b, p. 22).

Doll: I am William Doll. I am also a curriculum theorist. I use chaos theory to talk about curriculum in science. Although chaos theory is complex, I want you to focus on the idea that chaos is non-linear—the way curriculum should be.

Mrs. Pequod interrupts.

Pequod: I hope your students are smarter than mine. Chaos theory is not in our curriculum. Thank goodness.

Doll: Mrs. Pequod, may I call you Delores?

Pequod: If it saves us time with fewer words…sure.

Doll: I am not suggesting that every teacher teach chaos theory. Although, you might be surprised how many teachers and students would find it interesting. I think we need to expand monocular visions, monolithic thinking, and linear thinking to include more dimensions. Here is a diagram of the "owl eyes" that represent chaos theory (Doll, 1993, p. 93). *He holds up a book called* A Post-modern Perspective on Curriculum *(Doll, 1993)*. Can you all see the many intersections? Curriculum should be a multitude of relationships we need to view when considering teachers, students, approach to learning This is how real learning occurs…through lots and lots of connections and intersecting points.

The fourth member of the panel has now joined them.

Dr. Madeleine Grumet: Good morning, everyone. I am Madeleine Grumet. Did I cut in front of you, Dr. Schwab?

Schwab: Oh goodness no. Go ahead.

Grumet: I am sorry I am a running late. I am so glad to be here this morning. When adding dimensions and intersections to the curriculum being taught, I feel that actual examples should be considered as a very important addition... We must remember as we teach that the world must be part of our teaching. How can we not allow all aspects of our world "into our method" (Grumet M. R., 1990, p. 107)? Multiple relationships must be considered, "relations to other people, then those relations as they appear in the transferences, ideologies, and systems of thought that shape our culture must be there too" (p. 107). When we share with others, we are not to simply impart knowledge. Curriculum is multi-dimensional and impacted by many influences in the classroom and in society.

Schwab: Well put Madeline. I am Joseph Schwab. I taught biology just like you Mrs. Hoffen. I am thinking you must be a biology teacher too Mrs. Pequod. Like you Mrs. Pequod, I have a very strong opinion about what science curriculum should include. The subject matter of science "comprises all natural phenomena which can be made to yield general truths when subjected to the method of science" (Schwab, 1978, p. 68). Defining exactly what science is and "how to teach it are our problems. Yet, in only one sense, there is no problem. We all know what science is. There is no difficulty in distinguishing its subject matter, as may be the case with the humanities" (p. 68).

Pequod: I do teach Biology. I am a utility teacher. I have taught all the sciences at one time or another. I can follow any script, any technique. If you want the job done right, you want me in the classroom. If you want educational chaos…you want her. We have a wonderful textbook with all the basics of biology. The textbook is even aligned to the standards.

Schwab: Just to interject, my first teaching position involved me teaching every subject aside from math and foreign language. Honestly, as much as I like structure, I don't think one standardized technique or one theory can get the job of curriculum building done.

> To employ only one doctrine as a principle will give a biased view of the nature of science, and to teach a single doctrine should be to the student only misleading or confusing or both, because no single doctrine is more than a partial statement—partial in the sense of incomplete and partial in the sense of being based upon a given set of epistemic or metaphysical presuppositions. (Schwab, 1978, p. 72)

Teachers not only have to consider science, they must also consider theoretical views of science education. "Theories of curriculum and of teaching and learning cannot alone tell

us what and how to teach, because questions of what and how to teach arise in concrete situations loaded with concrete particulars of time, place, person, and circumstance" (Schwab, 1978, p. 322)**.** "The incongruity of theory cannot be corrected by a fundamental change regarding theory or practice" (p. 322).

He: Theory and practice, the two must come together. A new entity must be created between the two.

Hoffen: Thank you, Dr. He. Today's state of affairs concerning education in science classrooms is in dire need of rethinking, revisioning, revising, reconceptualizing— Let me give you a quick update about what is going on here, in this school district. We have Performance Standards that dictate what teachers should teach. I have provided each of you a copy. The desired learning is to result in predetermined prescribed outcomes. Currently teachers are required to post these standards on the concrete classroom walls. The entire teaching schedule is dictated by a strict curriculum map. This map not only tells when topics should be covered, it determines the sequence, and time allowed per unit. This map is packed full of science objectives. If students have difficulty with an objective it is virtually impossible to find class time to address remediation. Finally this map sets the schedule for benchmark testing. That procedure was covered in detail earlier. We spend many days of instruction testing students with standardized benchmarks and end-of-course tests. When students are not being tested, they are being drilled on how to be successful on standardized tests. Our district expends large amounts of energy on staff development to teach teachers the right formula for teaching so the curriculum map can be efficiently followed and students can be successful on standardized tests.

"The advancement of understanding cannot occur when government intervenes in the intellectual lives of teachers and students…as in 'No Child Left Behind'" (Pinar, 2004, p. 208). Those standardized tests unfortunately are just one moment in time. They are no more than a snapshot of what a child can do at one exact moment. An objective list can never be all-inclusive. Any list at all should be a fluid document, subject to change. In my early graduate school days I studied that life experiences must be part of education "demonstrated by providing intellectual and lived bridges between self and society" (Pinar, 2009, p. 9). Teachers have an obligation to teach students more than the simplified standards posted on that concrete wall—curriculum should reveal "a depth and range of meaning in experiences which otherwise might be mediocre and trivial" (Dewey, 2009, p. 129).

Grumet: I know I am interrupting kind of early on here. I want to say a word or two about *reconceptualizing*. I think the term *reconceptualization* may be appropriate as long as it is not to be confused with the movement associated with the field of curriculum studies in the early 1970's. I also want to make sure you understand that *reconceptualization* of any curriculum "requires a more than reflexive somersault that scoops up our old, flat ideas and turns them over" (Grumet, 1999, p. 25). A recycling of the same idea in a new package does not adequately describe the term.

Hoffen: Thank you, Dr. Grumet. I like to say that reconceptualization is more than a game of 52 card pick up. We can't throw up all the ideas and then just let them fall in a new-fangled arrangement…nothing new is created. We can't just keep recycling the same ideas over and over and expect anything different to happen. I have sat in staff developments for 24 years. Every few years the same information about improving our teaching is presented in

a different package. As far as what I want to accomplish in my classroom concerning science education and the curriculum I bring to my students, I think I prefer to use the word resurrection. “Philosophers since Plato have told us that education is more than a succession of units, courses, and programs” (Cremin, 2000, p. 33). “Questions of value, belief, and loyalties” must be included (p. 33).

Grumet: You just used another “r” word. By thinking back to your goals you were able to discern the word you were looking for. Reflexive is a term that stresses the importance of “reclaiming curriculum as we have lived it” and being able to “test our conceptual schemes and descriptions of it against the evidence of our experience” (Grumet, 1999, p. 25). Now that I think about it, I have a feeling I know why you prefer the term resurrection…but I will hold that thought and let you talk.

He: My dissertation chair often spoke of these connections. He would say “Education, experience and life are inextricably intertwined” (Clandinin & Connelly, 2000, p. xxiii).

Hoffen: Intertwined…I really like that choice of wording, Dr. He. Dr. Grumet mentioned that we must bring the world into our teaching. Curriculum intertwined with the world. My students pay attention more when they are interested in what is going on in class. I find that allowing them to be stakeholders in the daily plans, and subjects to be talked about, makes them take better charge of their own learning. Cells, for instance, is such an abstract subject for students. When I present cells in an interesting manner, and let students begin researching, they find a reason to study cells. I invite them to view cells through the use of stories. We begin by studying Anton Von Leuwenhoek and his invention of the microscope. Then, we add Robert Hooke to the story of cells. Who saw

cells first? This is a tough question to answer for students. Their textbook tells a story about Hooke being the first to see and name cells. Students are asked to begin researching this topic on their personal devices. Then the arguing ensues. Hooke was first. No Leuwenhoek was first! The stories help students make connections. These connections may deal with a student's interest, or the value of the student's culture that they bring to the classroom. There are many relationships to consider. Curriculum is not exactly "neat and tidy," it is about the "interrelations between students, teachers, and texts" (Morris, 2001, p. 2011). Curriculum is a collection of noise in the classroom.

Pequod: Yep with 32 students talking at once, and that dang squawk box in the ceiling.

Hoffen: Well Delores, that is not the kind of noise I am talking about. I am talking about the interruptions that disrupt our thinking. Think about a group having a discussion. Someone says one thing and the discussion is carried in a certain direction. Then someone else's thinking is sparked by a previous comment. A chain reaction of sorts is activated in the classroom. Before you know it everyone is talking, discussing, and the conversation is growing. New ideas are created. I think everyone will be able to see the student's ideas in this afternoon's program.

The conversation is interrupted by a knock on the conference room door. Mrs. Hoffen walks to the door to find Alexis and Lydia, all smiles.

Alexis: Mrs. Hoffen, I had to bring this to you. *Alexis is holding a black t-shirt covered in cotton balls and glow-in-the-dark paint. Immediately, Mrs. Hoffen knows that the shirt is covered with HeLa cells.*

Hoffen: Wow ladies…this is wonderful… *She immediately pulls the shirt over her head....*

Pequod: Speaking *under her breath.* But isn't it Wear Red Day…

Lydia: The paint on our shirts is still drying. Mine has... *Mrs. Hoffen interrupts.*

Hoffen: Girls this is incredible…you have made my day. I am somewhat busy right now with our guests. Can I catch up with you later?

Alexis: Sure … *The girls run off. Mrs. Hoffen closes the door.*

Hoffen: I am so sorry about the interruption. The girls are so excited about our day. Again, I apologize.

Pequod: Noise, interruptions…how anyone is supposed to be able to get any work done around here. Why are those two allowed to run all over the school? Why are they not in class?

Barton: That is not just a HeLa shirt. This young lady shared the story of Henrietta Lacks this morning when she gave me these red Mardi gras beads. She is beginning to "recognize and exercise [her] voice and autonomy" through your project (Barton, Ermer, Burkett, & Osborne, 2003, p. 118). Wear Red to Honor Henrietta Lacks helps your students "learn to become agents of change in their own lives, and within the discipline of science, using their authority to challenge the traditional cultural practices of science and education" (p. 118). Both of these girls are proud to be learning science and teaching others about Henrietta Lacks. The girls are engaged "in relative science" (p. 119).

He: Thank you, Angie, for reminding us not to view the girls' visit as just an annoying interruption. *She glances over at Mrs. Pequod and smiles.* Mrs. Hoffen, can you share with us the significance of your shirt? I am just having a hard time figuring out why it has cotton balls all over it.

Hoffen: *All smiles, she picks up a dry erase marker and proceeds to the white board*. You see, this is a cell membrane. She draws a shape similar to the ones on her shirt. Most of what we can see with a basic microscope is a cell membrane and a nucleus. The cotton balls represent the nucleus.

He: Did the girls get cotton ball happy? There cannot be 2–3 nuclei in each cell.

Doll: I can answer that one. Cancer cells have more than one nucleus in each cell.

Hoffen: Yes, very good Dr. Doll. I think the girls have shown this very well here. I am just so proud of them. We read about cancer cells in *The Immortal Life of Henrietta Lacks*. Each student has to create a product to tell part of the story…the girls were drawing rough drafts of their shirts earlier in the week. I hope you get to see those. But the giant HeLa cell shirt was a surprise! I am so excited!

Pequod: That is all fine and good, but can we get on with our meeting, minus the noise and the interruptions (*she glares at Dr. He*)?

He: Yes Mrs. Pequod, We can continue.

Schwab: I have a quick question. Margaret, do you feel the standards are insufficient?

Hoffen: Honestly, the standards are packed. Coming from a science background myself, my fear is that the standards do reduce and water down science to a list of facts to be memorized by the students.

Schwab: By oversimplifying science to a list of standards or facts and processes to simply memorize, "we block progress toward one of the most widely held, if impossible goals" of what I call "liberal science training" which is "to provide the student with an adequate

picture of the world" (Schwab, 1978, p. 99). "To give a simple picture of a complicated world is not to give the scientist's picture of that world. By so doing we make the picture not only inadequate (which it will always be) but false" (p. 99). I have a moral obligation to my students. I take their education seriously.

Hoffen: Thanks Dr. Schwab. It does seem that the simplified version of the curriculum is repeated over and over. I have taught biology in 5th, 7th, and 9th grades. The standards repeat themselves. The basics have to be extended or complicated so students can see how they can be applied in laboratories and life. This means teachers have to make a commitment to the students to teach more than the standards. It would be easier just to follow the standards. I can't see myself doing what I consider the minimum in my classroom.

With all that is happening in education, it would be easy for "teachers to resign their professional authority and ethical responsibility for the curriculum they teach" (Pinar, 2004). In education, the process begins with a commitment to students and the school or university. Pinar (2004) tells us:

> Whatever our fate—given our betrayal by government and by powerful professional organizations, the future is not bright—we must carry on, our dignity intact. We must renew our commitment to the intellectual character of our labor. We can do so first by engaging in frank and sustained self-criticism. (p. 9)

No matter how difficult the journey, teachers must be willing to make the commitment to become more intellectual. If we want to model leaning in our classrooms, our students

must see us taking an active role to reflect on our own learning. I'm am sorry, I get a little carried away when I start talking about curriculum theory.

Pequod: So you are telling me that if I analyze myself, my learning, that I can begin to cure all the ills of education? Ha, I can tell you that I am not the problem. I teach the standards. I have order in my classroom. I can guarandamnteeyou, excuse my French, that my students are not running the halls and gluing cotton balls while I am in a meeting. And why are you talking so much? I am here to listen to the so-called experts.

Hoffen: If you will allow me to continue. This commitment should bring about change in not only their personal lives but in education and society. We call this journey of self-critique currere. Currere is a systematic journey. The steps of currere also offer a format that may or may not be needed to accomplish a given set of goals. "It is suggested then one must return to the schooled, beginning, to the elementary years, to wherever one is able to reach" (Pinar, 1975, p. 8). The return to the past is the beginning of the autobiographical journey.

Pequod: (*rolling her eyes, obviously still annoyed*) So, I take a trip down memory lane and I change society?

Grumet: Maybe I can help here. This goes back to the reflexive analysis I mentioned earlier. The idea is for you "to become the active interpreter of [your] past, as well as heighten [your] capacity to be the active agent of [your] own interests in a present that [you] share with [your] community" (Grumet, 1999, p. 28).

Pequod: Okay, okay, I understand what reflexive means.

Schwab: Reflexive thinking is simply a way to view things from more than one perspective—"deliberately…looking through a succession of lenses," standardized education offers only one point of view, a one-size-fits-all education (Schwab, 1978, p. 325). Extending educators' possibilities to "weigh the alternative formulations of a problem thus achieved and for choosing one to follow further, generate alternative solutions" and trace each "alternative solution to its probable consequences" (Schwab, 1978, p. 325). Eclectic inquiry demonstrates the intersecting of theory and practice from multiperspectives in classrooms. To choose a single framework for this endeavor would be to adopt the theoretical framework of but one discipline or one portion of a discipline. Curriculum Theory as a discipline is interdisciplinary similar to science. I think Dr. Doll will agree that my version of eclectic arts and his ideas concerning chaos theory will allow us to reconceptualize or resurrect the current standardized curriculum. I like how the word resurrect sounds.

Doll: Thank you for endorsing my thinking, Dr. Schwab. I am truly honored. Current education is characterized by a "linear sequential, easily quantifiable ordering system," combined with expectations of "clear beginnings and definite endings" (Doll, 1993, p. 3). We as educators can realize the potential of finding a "complex, pluralistic, unpredictable system or network" upon which to build a foundation for educational experiences for students and teachers alike if we are willing to expand linear thinking (Doll, 1993, p. 3). I want to bring attention to all the key players in this situation, the teachers, students, and curriculum. I propose a "new concept of curriculum" emerging as "new relations between teachers and students" (p. 3). This new relationship of curriculum, students, and teachers will be quite complex…"less ordered and more fuzzy" (p. 3). Such a relationship cannot

be complete without considering the life experiences of each person involved, as well as the real-life consequences and applications of the curriculum taught. As educators, we must find our place in this highly textured, woven fabric. Just as threads intersect in a woven fabric—the weaving of a curriculum is like a….

(*Hoffen finishes Dr. Doll's sentence*)

Hoffen: "fabric with brilliant threads throughout" (Krall, 1999, p. 5). That came from one of my favorite books. I love the fabric metaphor. Another favorite, written by Parker Palmer (1998), says, "Good teaching cannot be reduced to technique: good teaching comes from the identity and integrity of the teacher…Good teachers join self and subject and students in the fabric of life" (pp. 10-11). A fellow teacher described the woven fabric between teachers, students, and curriculum as "seamless" (Callan, 2013). We should not know where each relationship begins or ends.

Schubert: Each class meeting is a gathering…Gatherings should be noisy, "wiggly, surprising, move as interests move, create spaces where diverse voices can be heard and appreciated" (Schubert, 2009b, p. 27). I want to repeat the idea here that the key players or stakeholders must receive the utmost respect in this planning. I am particularly impressed that Dr. Doll and Dr. Schwab have taken time to address the necessary relationships that should be incorporated in a curriculum. I want to extend that idea to include how these individuals live in and out of schools. A student being involved in the creation of curriculum is what Dr. Schwab and I call "practical inquiry" (Schubert, 1986, p. 288). Students should be offered "a more active role...curriculum development" (p. 293). "Practical inquiry centers on deliberation, the human search for meaning and

understanding that enriches groups and institutions as they continuously refine their sense of value and direction and the means to move toward it" (p. 288). We must ask our students and ourselves what knowledge is worthwhile. "What is worth knowing, needing, experiencing, doing, being, becoming, sharing, contributing, and wondering?" (Schubert W. H., 2009b, p. 22). Do you remember the story of the shepherd boy, Santiago, in *The Alchemist* (Coelho, 1988)? While reading this story "I became convinced that finding the treasure was less important than the quest, the journey, or the curriculum that leads toward it" (pp. 22-23). The journey is in the living each day.

> This curriculum is sustained by a steadfast gaze toward life more worth living and a world more worth inhabiting. To embody such a gaze, to encourage it in others, and to find more about it from their experiences has been and continues to be the essence of educational relationships I try to cultivate as a professor. (Schubert, 2009b, pp. 22-23)

The job is a lot harder than it sounds. Others feel as you do, Mrs. Pequod. They simply feel that change is not needed. Still others feel that change is necessary. The issue comes in how to begin the process of change. I must note here that having "faith in democratic institutions" is not going to be enough to get this journey of change started (Schubert, 2009b, p. 23). Educational institutions were and are "intricately controlled by states, churches, corporations, militaries, and other bastions of autocracy and imperialism, it has become necessary to reconceptualize curriculum in many different ways to critique current conditions and to cultivate integrity, beauty, justice, and humanity" (p. 23). Let me go back and edit and say instead of reconceptualize…resurrect. I liked your use of that term, Mrs. Hoffen.

Hoffen: All the stakeholders in education have potential to provide input into a new curriculum. Don't you think that in today's teaching and learning factory model, children and teachers are disrespected and oppressed? I think you would all agree that current conditions in our schools are oppressive. Students' voices are being silenced, learning prescribed:

> If students are not able to transform their lived experience into knowledge and to use the already acquired knowledge as a process to unveil new knowledge, they will never be able to participate rigorously in a dialogue as a process of learning and knowing. (Freire, 1970, p. 19)

Dialogue is a necessary entity when searching for what is worthwhile.

Schubert: Dialogue, discussion, and discourse are all necessary in finding meaning and personal connections in curriculum.

Hoffen: Curriculum has several dimensions for teachers. There are the pressures of standardized curriculum, curriculum maps, and evaluations.

Schubert: The teacher is the tour guide on this wonderful search for what is worthwhile. The teacher ultimately must embrace intelligence, allowing students to leverage what they know they can successfully accomplish. As students develop this essential opportunity, their imagination, interest, and creativity allow them to create a love for their learning that may endure the travesties and injustices they face both in and out of the classroom.

Hoffen: I like how Parker Palmer describes my teaching duties. He says "Good teaching is an act of hospitality toward the young, and hospitality is always an act that benefits the host even more than the guest" (Palmer, 1998, p. 51).

Pequod: You do not teach the same kids I do…Those kids need discipline, structure, rules…I am not a Walmart greeter…yet.

Hoffen: In other words, those difficulties we face in our classrooms are made worthwhile when we see our students creating their own love for learning. Oppression that must be overcome to teach outside the box is not part of the educator's imagination. This oppression is real. Oppression of all kinds exists in classrooms and teaching. Brian Schultz (2008) often said that "it was essential to allow the children to become part of the curriculum making, by following democratic principles and encouraging engagement in a democratic experience. Otherwise, the classroom and its structures can dehumanize students" (p. 140). Teachers must not overlook the student perspective when creating curriculum.

Schubert: Brian was one of my graduate students. His students took on city hall to bring change to their school. The students became activists for change. Brian allowed them to have a say in their curriculum. The students received national attention for bringing about changes in their school building in a very poor inner-city area of Chicago (Schultz, 2008).

Hoffen: Brian's work demonstrates that "education should endeavor to understand the curriculum across the school subjects and academic disciplines…as well as focus on interdisciplinary themes—such as gender, multiculturalism, or the ecological crisis—as well as the relations among the curriculum, the individual, society, and history" (Pinar,

2004, p. 21). As I said earlier, "the dominant interest is in learning how to teach more effectively, so that students can learn more quickly, as measured on standardized examinations" (p. 209). In reference to oppression in present-day education, an educational experience constructed with the use of curriculum studies will require that "justice, democracy, and human rights" have a place (Pinar, Reynolds, Slattery, & Taubman, 2008, p. 508). Teachers and students alike should be privy to this type of education. Students' success should not require them to abandon their defining characteristics: "ethnicity, race, and sex, all of which are stripped away" (p. 304). Education should, with the help of technology and creative teaching methods, "cross borders and engage differences of culture, history, race, religion, and nation" (Asher, 2009, p. 9). Amazing opportunities…endless possibilities!

He: Every student should be able to be comfortable and receive instruction that meets their needs. Teachers are bound to a curriculum. That much is out of their control. But only teachers possess the power to adjust their teaching approach. Teachers need to remember that they have more power to change their curriculum while they are employed. Unemployed teachers have no power. Teachers cannot walk away from their classrooms no matter how unpleasant their duties become. Good teachers feel responsible for their students. They have to gear up each day and "fight with grace" (He, 2014).

Pequod: I have held my tongue…as long as I can. I personally see no problem with standardization. In addition, as far as the event going on in the commons today, I see no relation to science. Justice and democracy should be saved for social studies class. We have too many objectives to teach. Teaching is simple…we teach the standards, the students take a standardized test, we know that learning has taken place.

Barton: I must disagree, Mrs. Pequod. Curriculum really can look like Dr. Doll's owl eyes…and be very multidimensional. We as teachers have the "potential for making science transformative in the lives of our students, thus creating opportunities for students to have resonant learning experiences that are educationally meaningful and empowering" (Barton, Ermer, Burkett, & Osborne, 2003, pp. 118-119).

Hoffen: I want to deploy "radical" curriculum theory and thought, not only when working with my students but in the delivery of the required linear, standardized curriculum currently posted on the concrete walls of my classroom (Deever, 1996 p. 174). Not only is science full of very complex subject matters, science should be "accessible to all; interesting and exciting; real, relevant and useful: non-sexist (even antisexist) and multicultural/antiracist; personally relevant and humanized; value laden and caring" (Hodson, 1998, p. 6).

There is a knock on the door. Mrs. Pequod, closest to the door, gets out of her chair and answers. A group of students shows up at the door of the conference room. All dressed in red, wearing red Mardi gras beads, anxious and wanting to talk all at the same time.

Pequod: You kids have to go to class.

Alexis looks past Mrs. Pequod and around to Mrs. Hoffen.

Alexis: Mrs. Hoffen…which was a bigger problem in the 1950's—sexism or racism?

Hoffen: Both were problems.

Alexis: I think racism was a bigger problem because it affected men and women…

Lydia: I think sexism was a bigger problem, because women were more impacted by racism than men were.

Both girls are sporting red shirts with the name Henrietta Lacks across the front in large puff paint letters. On the back of Alexis's shirt is a Venn diagram. The circle on the left is labeled "Whites," the circle on the left is labeled "Blacks." Lydia's shirt is very similar, but her Venn diagram is labeled "male" and "female" with a large "1950" painted above.

Hoffen: An author named bell hooks writes about the racism and sexism she experienced while she was in college. She attended college in what she called "the wake of a powerful anti-racist civil rights struggle" (hooks, 2010, p. 2-3). This was in the 50's around the same time Henrietta lived. Hooks tells us that "the outspoken sexism of [her] undergraduate male professors was even harsher than their covert racism" (hooks, 2010, p. 3). She experienced racism and sexism at the hand of her teachers "who appeared to derive their primary pleasure in the classroom by exercising their authoritarian power over [her] fellow students, crushing [their] spirits, and dehumanizing [their] minds and bodies" (p. 2). Alexis, can you "imagine being taught by a teacher who does not believe you are fully human" because you are black (p. 2)? Ladies this is a very complex issue. I know you two are having a disagreement over trying to decide who is right. Maybe both of you are. Unfortunately, sexism and racism still exist today. Both are major problems. bell hooks became a teacher. As a teacher she believed that she had to write about these problems from her perspective as a Black woman. There were not many Black women in her time writing about issues of civil rights. I think our focus has to be on making others aware that racism and sexism still exist today. Which is exactly what you two are doing today by sharing Henrietta's story. If people don't know, then nothing can be done.

Pequod: (*Clears her throat loudly*)

Alexis: (*Whispers*) Thank you Mrs. Hoffen. We will google her. I want to know more. I guess we will be on our way back to class now.

Hoffen: I apologize once again for the interruption. *She looks at the group at the table and the group at the screen*. Now where was I…?

Schubert: I want to hear more about bell hooks.

Hoffen: We could talk about bell hooks all day. She is an incredible writer. Her work made me view racism in a way that I had never understood before. I was guilty of thinking racism was not an issue anymore. "Although, our nation has made significant strides in the area of civil rights, the United States remains a society where racial segregation is the norm" (hooks, 2010, p. 95). hooks believed that she should help students become the best students they could be. She believed in building community. She writes that "telling stories is one of the ways that we can begin the process of building community, whether inside or outside the classroom" (p. 49). In a classroom it is by "sharing both true accounts and fictional stories that help us understand one another" (p. 49). I remember now. Before the girls interrupted, we were talking about science.

We have a very special mission. Within the heart of each science student there is more to be considered than that student's grade on an end-of-course test. I don't think science teachers are the only teachers guilty of "academicizing their subject, and sometimes more so. We often treat science education as the manipulation of complex, abstract, conceptual schemes that will only later on, if at all, be applied to real situations, events and problems" (Hodson, 1998, p. 6). We all have those students "who are successful in school science" and are usually good at remembering, analyzing, and "tackling academic puzzles but

cannot always use their knowledge in real situations" (p. 6). Some students "never tune in to science at all. For them [science] constitutes esoteric and abstract game playing remote from their everyday concerns" (p. 6). For other students science "is difficult and forbidding, even intimidating and remains the province of experts. Few students ever achieve a personal understanding of science; few students ever really own the science they study in school" (p. 6). That is unless the students find a way, a place, and a space that allows them to connect personally with the science.

Students and teachers need a space for teaching and learning. The learning that I desire to take place will not be something that can always be measured with a paper and pencil assessment. The learning will be evidenced by what my students carry with them outside of my classroom and into the world. The space we create will make time for students to develop their voice, their thinking, their relationship with the subject matter and the world in which they live.

Barton: The girls' interruption was timed perfectly. This Wear Red Day as a part of science curriculum allows science to be "recast as something that youth create in the process of responding to their own questions and needs. It is not something that they have to learn for a test or for a project that they must complete to satisfy a teacher's requirements" (Barton, Ermer, Burkett, & Osborne, 2003, p. 118). The idea that you would allow the students to choose a portion of the story to tell, which gave them a space to ask questions of their own, is empowering to students. In this type of activity, "the process of doing science involves [students'] agency and authority in articulating their questions, and in constructing ways to respond to those questions" (p. 118). The girls both chose a question, then chose how they would respond to that question.

Grumet: Can all of you recognize what the girls have learned, not just from what they have painted on their t-shirts, but in their questions? A standardized test cannot measure that. Remember "Curriculum is not text… curriculum comes about at intersections via interpretations" (Grumet, 1989/1999, p. 240). Studying interpretation is a political endeavor. It is through the interaction with text that curriculum can be formed. By providing the opportunity for the students to interact with the text, curriculum will rise from the intersections.

Hoffen: I do have a specific question concerning practice for all of you theorists. One of the weaknesses I experience as a teacher is in working with minority students. This was actually one reason why I chose to begin sharing the story of Henrietta Lacks. I wanted to connect my African-American students to science with the story of Henrietta Lacks. Everyone we study in science up to cell division is white and male.

Schubert: Margaret, have you ever looked into Chris Emdin's work? Emdin (2011) says that "One resounding theme in the academic research on Black youth in science education is that, despite the best efforts to close achievement gaps, they still exist across the educational landscape" (Emdin, 2011, p. 284). This achievement gap seems to be of utmost importance when school leaders are looking at test scores. Researchers "spend an inordinate amount of time and effort describing and discussing the fact that such gaps still exist" (p. 284). Much of Emdin's work focuses on how important it is for researchers and practitioners to be "scientifically minded and that it is the environments' (school and society) ineffectiveness in fostering this inherent interest that disfigures urban Black youth's passion for the sciences" (p. 284).

Hoffen: I remember Emdin's work. I watched a video about him using hip hop in his inner-city classroom. I use hip hop in my classroom when I find something that seems appropriate. My students have written raps for their Henrietta Lacks projects.

Schubert: Emdin (2011) suggests that we use what he calls "reality pedagogy" (p. 284). "Reality pedagogy builds upon culturally relevant and critical pedagogy, moving us beyond efforts to address the challenges within urban schools that focus on the academic deficiencies of youth to instead support both teachers and their students in improving their experiences in classrooms" (p. 285).

Hoffen: Thanks for jogging my memory Dr. Schubert. I read that article when I was in Dr. He's class. Emdin (2011) has a plan of 5 C's to help teachers begin the process of incorporating reality pedagogy. Honestly, I don't think I can quote all five, but I know that allowing the students to have ownership in their learning through "coteaching" is one (p. 287). Let me see there was one about dialogue.

Pequod: Dialogue does not start with a c.

Hoffen: "Cogenerative dialogues, Co teaching, Cosmopolitanism, Context, and Content" are Emdin's 5'C's (Emdin, 2011, p, 287).

Pequod: I could use a Cosmopolitan about now.

Hoffen: What is so inspiring about this particular article is that it gives teachers a fantastic guide to incorporating items in the curriculum that their students will connect to. I wonder what Emdin would say about Henrietta.

Grummet: I have heard Chris Emdin speak about reality pedagogy. What I like in particular about his work is that some suggestions for practitioners "go beyond the 5 C's for reality pedagogy [and] involve developing the appropriate mind-set for effective teaching"

(Emdin, 2011, p. 292). Emdin is very practical. He wants to provide teachers with the "cultural tools teachers need to ensure that they are properly enacting reality pedagogy" (p. 292). In the "implementation of cogens and coteaching, teachers must come to the classroom with a willingness to listen to students, and an acceptance that the teacher is the content expert while students are the content delivery experts" (p. 292). "With the implementation of cosmopolitanism, content, and context, teachers must be willing to loosen existent classroom structures to allow students to enact behaviors that may not be usually accepted in classrooms" (p. 292). Teachers have to be willing to allow their students to be vocal and even "critique their teacher's instruction" (292). I also likes the idea that his pedagogy involves teachers and vulnerability. As teachers we all have to be "vulnerable enough to accept when there are gaps in their content expertise, be willing to confront their fears of youth and their communities, and accept the inherent value of urban youth to their own teaching and learning" (p. 292).

He: These spaces Emdin talks about are so important. A space for students to be more vocal. A space for teachers to be vulnerable. Every classroom could benefit from such spaces. Homi Bhabha was one of the first to write about in-between spaces in reference to cultural differences (Rutherford, 1990). Relationships naturally provide opportunities to create in-between spaces, many possibilities for spaces to be created, and spaces to be filled. As you introduce the story of Henrietta Lacks, you are opening up opportunities for discussion of race. This is something that needs to be happening in the U.S. South on a daily basis. The story allows you to bring race to the forefront of the conversation. If you ignore your race, you become isolated. If you ignore the race of your students, they become isolated. "The interconnection between humanity, nature, and cosmos needed to

be recognized and fostered, this creative, harmonious, associated, joyful, and worthwhile self cannot be cultivated in isolation" (He, 2013, p. 63). In-between spaces created in the classroom, whether the space deals with cultural differences, relationships, or subject matter, will "flourish through the joined efforts of individuals who invent spaces for creating values for all so that all humans might live more robustly, develop capacities more fully, and become humane and educated in an increasingly diversified, complicated, and contested cosmos" (He, 2013, p. 63).

Hoffen: Cosmos. *Speaking excitedly*. Have you all studied Alexander Von Humboldt? Humboldt and I share similar backgrounds in science, characterized by empirical data and strict method. Humboldt "came to believe that imagination was as necessary as rational thought in order to understand the world" (Wulf, 2015, p. 36). "Goethe encouraged [Alexander] to combine nature and art, facts and imagination" (Wulf, 2015, p. 38). This new thinking allowed Alexander to think beyond science and see the connection of science to the world and the peoples of the world. Humboldt, who can be described as a scientist, an explorer, and a bridge builder, spent his life traveling, observing, collecting, measuring, and connecting. Humboldt wished to create bridges between "peoples, disciplines, places, and historical eras" (Walls, 2011, p. 10). Humboldt hoped to simply "create a zone of exchange rather than domination" (p. 10). I want to create this kind of "zone of exchange" in my classroom (p. 10). I imagine he created a global network that looked like a very complex spider web. Like Dr. Doll's Owl Eyes (Doll, 1993).

Pequod: Chaos, I tell you. I am here to discuss educational theory, and she is spouting off stories about an explorer whose accomplishments were forgotten long ago. We can barely get

these students to memorize the parts of the cells, and you want to make a million connections.

Hoffen: Alexander von Humboldt predicted problems with "deforestation" and "climate change" years ago (Wulf, 2015, p. 58). Tell me that is not relevant to science education and society.

Schubert: Janet Miller also spoke about building bridges and creating spaces. Have you looked at Janet's work?

Hoffen: I actually met Dr. Miller at a conference in Philadelphia. She told me that she hopes that people who read her work will "consider their own academic interests as necessarily always shifting and changing too... and that's all part of the generative work of thinking, teaching, researching, writing" (Miller, 2014). She went on to tell me that her personal research is almost "always most impelled by collaborating efforts with [her] students and colleagues" (Miller, 2014). In essence, she is saying that building bridges with students and colleagues drives her own learning. Without these connections, she could not write. In order for a shift in our thinking to occur, we have to create a third space, a space of transformation…a bridge.

He: We keep dancing around the idea of in-between and so-called bridges. Let's get specific. How will you build that bridge between your students and science?

Hoffen: I must bring all the stakeholders together in an effort to bring about change. The first set of bridges to build will involve relationships—teacher and curriculum, teacher and students, then finally students and curriculum. To construct a bridge between the students and the curriculum I will first invite my students to the text. Simply put, I will tell them a

story. Not just a story for the sake of a story— a well-told story that will grab the students' interest. The excerpts read to the students should connect to the standards. It is important not to tell the whole story at once. The excerpt or story shared should leave "gaps for students to fill in, holes which encourage them to actively intervene in the proceedings to assume responsibility" (Barone, 2000, p. 62). The gap is the third space. Here in this space, what is said, or sometimes what is not said, will create discourse between students and students, students and teachers, students and the curriculum…just to name a few opportunities. This is the transformative space where students can think about their connection to the story, to the curriculum. Last, the students will need to share their personal reflections with each other. The weaving together of their stories with the stories of others is how the new story, or the new curriculum, will be composed.

I consider myself a second-generation bridge builder. My daddy built bridges…his bridges allowed for travel over major highways, major bodies of water. The bridges that I seek to build are not forged of concrete and steel. I seek to build bridges that will provide a structure for meaningful lifelong learning. The lessons learned in this construction process are not just for students. Teachers must continue to learn. Is it possible for us to see a democratic education for all, an education that is socially just? I wonder if science itself can become a bridge that cannot only help students find education meaningful, but also help them become citizens that are more democratic? Can education become like HeLa cells? "A process called immortalization occurs occasionally, and in such culture the cells do not die out but continue to grow indefinitely if provided with adequate resources" (Van Valen, 1991, p. 71). As a teacher, if I am able to create a space,

complete with adequate resources for students in my classroom to grow and learn continually and indefinitely, could love for learning become immortal?

Think about it. Students respected for who they are and the life experiences they bring to the classroom, building bridges with each other, their teacher, and their curriculum to create meaning…meaning custom-made to meet their needs. Discourse levels the playing field. So students that have always performed poorly in school are able to participate and enter the conversation. Think about it. Dr. Barton, I read this in your book: "In the classroom discourse, students' personal experiences with the subject matter were explicitly encouraged by the teacher and leveraged upon to delve deeper into the science content at hand. In this manner deliberate connections were made between school science and the relevant community knowledge students bring with them into the classroom" (Basu, Barton, & Tan, 2011, p. 58). The story of Henrietta Lacks allows me to create this experience for my students. The activity brings "student voice into science classrooms in ways that foster critical democracy—-not only in how teachers and students enact classroom life together, but also in how students and teachers are supported in leveraging their school experiences towards building a more just world" (p. 8).

Pequod: Here she goes with democracy in science again. Did you not hear my protest last time?

Barton: Building these bridges and working to achieve a democratic classroom is rather complicated. A basic democratic classroom should include student participation in decision making.

> Such decisions include curricular scope and focus, classroom participation structures, and rewards and punishments. Yet such rights and responsibilities are much more expansive than decisions around how classroom activities happen. More deeply embedded in life in classrooms are the social and cultural structures that maintain relations of power among students and teachers. It is also necessarily part of the democratic classroom that the responsibility for shared power and the protection of marginalized voices and perspectives is also elemental. (Basu et al., 2011, pp. 5-6)

By fostering what a real democracy is in the classroom…the discourse has a place to happen. It is my experience that students get more involved with their learning. Here, you can read about it yourself.

Pequod accepts the book when Barton hands it to her.

Pequod: Oh. *She takes the book, looking puzzled.*

Grumet: I want to go back to Humboldt just one moment. What I take away from your story about Alexander Von Humboldt is the mention of the word discourse**.** Curriculum is "a process of interpretation…that includes …discourse, community politics, [and] bureaucratic regulations, and publishing agendas determine the rules of that conversation, undermining its promise of open inquiry and democratic participation" (Grumet, 1989/1999, p. 235). I ask you all, does this sound like a description of a classroom…or does it sound like life? Remember I said that we have to bring method into our work with students at any level.

Doll: In an earlier comment I said it is going to take a "complex, pluralistic, unpredictable system or network" upon which to build a foundation for educational experiences for students and teachers alike (Doll, 1993, p. 3). Sharing the story, then also the subsequent stories composed by your students, does indeed form many intersections. I imagine this approach would certainly get everyone in the classroom involved.

The group hears a knock on the door. Ms. Sonnenschein, the receptionist, opens the door and addresses the group.

Sonnenschein: I hate to interrupt, but I have a tiny little message for Mrs. Hoffen.

Hoffen walks to the door and joins Ms. Sonnenschein outside the door.

Hoffen: Please hurry Krystal…what is it.

Sonnenschein: The actress you hired to play Henrietta Lacks in your play is here. She looks so real. She looks just like the picture on the book. I tried to talk to her but she just hurried through the door**.**

Hoffen: Actress? Thanks so much Krystal. Let me know if you see her again. (*Hoffen walks back into the room.*)

Barton: I "use the ideal of democratic education in science to call attention to ways of being in the classroom that position youth as important and powerful participants in their own learning and that of their peers and teachers" (Basu et al., 2011, p. 8). As Dr. Grumet said—you bring the world into your method. Now the students see that they are "also members of a larger global society who can leverage their lives in schools towards

making a change" (pp. 8-9). "Democratic classrooms position learning as a dialectic process where students and teachers learn to read the word and the world" (p. 7).

Hoffen: Students regardless of academic ability seem to respond well to the story of Henrietta Lacks, and the other stories I share in biology class. It is so sad that our students are assigned a value based on their latest benchmark, or standardized test score. It is also unfortunate that government and the administrators in education superimpose standardized images of who they think our students are and what they should become, and totally annihilate them as individuals. These groups are only interested in building robots or "compliant place holders rather than free thinkers or active citizens" (Ayers, 2004, p. 6). Tom Barone (2000) suggests that we need strong poets—"students who continuously integrate the content of disciplines (the content of life) into a coherent and personally relevant world view" (p. 126). His directive given to teachers is simple yet eloquent—"aspire to empowering students within a democratic school setting to act with a sense of personal integrity, responsibility, and autonomy" (p. 126). In my practice of radical curriculum theory, I want to help all students realize there is a strong poet deep inside them. Our students are not blank slates. Our students come to us "as a slate on which much is already written and where the learner writes new words and phrases in appropriate spots and rearranges phrases to make room for new ones" (Klassen, 2006, p. 826). Standardized testing requires that students wipe off their slate and give the "information back in essentially the same form in which it was originally presented" (Klassen, 2006, p. 826). Strong poets compose their learning. Standardization encourages that knowledge be returned to the teacher in the same form in which it was dispersed—

rote memorization. David Blades calls it "Bulimia" (Blades, 1997, p. 72)… Having to equate our students' learning with an eating disorder is a very sad state of affairs.

Pequod: (*quietly*) Sad? Those with bulimia will perform well on the test; that's not sad. If your students perform well, you might be able to keep your job.

He: I am glad you mentioned keeping jobs, Mrs. Pequod. It is a real problem. There will be no innovative curriculum or democratic classrooms, without teachers. I always find it ironic that "only power that springs from the weakness of the oppressed will be sufficiently strong to free both" (Freire, 1970, p. 44). Students are on the very bottom of the power structure. "Every individual brings value to society…more specifically to classrooms. The radical, committed to human liberation, does not become a prisoner…he or she enters into reality so that knowing it better he or she can better transform it" (p. 39). Our students need to know they can bring about change. Your young women running around giving out their red beads and wearing their t-shirts have hopes of creating change.

Another knock is heard at the door.

Pequod: Speaking of the little devils… I will get that. *She says this obviously annoyed, and terribly bored with the current conversation.*

Alexis and Lydia: Mrs. Hoffen, Mrs. Hoffen (*the girls speak together*). Mrs. Glover let us teach.

Alexis: We told the class we had to be the ones to tell the story of Henrietta…We told the class that the science is not the only issue…the people, the real people behind the science are important. Oh *she pauses*, Mrs. Hoffen, a man is looking for you. He says he needs to talk to you about something very important.

Hoffen: Can you tell him where to find me? I will see what he wants.

Schubert: Mrs. Hoffen, you are showing us up front and personal that there is a need to "avoid the polarization of teachers and learners"—students can be teachers and teachers can be learners (Schubert, 2009b, p. 184). Your young students are obviously excited about what they are learning.

He: William Ayers (2004) tells us that "school is a natural site of hope and struggle—hope hovering around notions of a future, struggle busting out over everything about that future: the direction it should take, the shape it could assume, the meanings it might encompass" (p. 20). Teachers and students must participate for there to be struggle. It is in the struggle that both groups of individuals can become educated.

Hoffen: It took a while for my students to become believers in this new way of doing things. In most classrooms, the teacher tells students exactly what and when to do…everything. Allowing students to have input will be a foreign idea for most of them. Students must learn that they are stakeholders in their own learning. The students feel powerful when they are making choices about their learning.

Pequod: In my own classroom, I provide students with the answers they need to learn. All they have to do is spit them back out to me. This prepares them for their state test. *She pauses.* Is this why they become disengaged from their learning?

Hoffen: I am always amazed when we discuss current issues, that we can find the same issues in literature over 60 years ago. Ralph Tyler (1949) told us "Education is an active process. It involves the active efforts of the learner himself. In general, the learner learns only those things which he does" (p. 11). As a teacher, I want to involve the students actively with

their curriculum. I hope that these alternative pedagogies will invite the student to "enter actively into, and to deal wholeheartedly with, the things that interest him and in which he is deeply involved and to learn particularly how to carry on such activities effectively" (p. 11). My students are teaching today. How is that for a change? We have to look for changes that depart from the norm. "Any real change is revolutionary—it represents some departure from the original" (Deever, 1996, p. 188). We as educators and students cannot wait for our entire broken system to undergo a revolution before we are willing to change. "The potential exists. If not now, when? If not now, why?" (Deever, 1996, p. 188).

There is a knock on the door before she can speak further. The gentleman knocking on the door opens it himself.

Alexis: I found him, Mrs. Hoffen.

Hoffen: Come in. Join our conversation.

Weaver: Hi everyone. I would love to, but I need to see Margaret for just a moment.

Pequod: Like everyone else who has knocked on this door:

Weaver: I hate to interrupt. *Margaret steps outside the room and pulls the door closed.* I can't find her *he speaks in a whispering voice*. When we were at Hopkins we were sure she would come here.

Hoffen: The receptionist said the actress that is playing Henrietta Lacks has arrived. John…I did not hire anyone to play Henrietta. Henrietta *is* here. My hands are tied; I can't go look for her. I have got to get back in this meeting.

Weaver: How are you being received? Any protests about your alternative pedagogies?

Hoffen: Just Delores Pequod's.

Weaver: Her name says it all. I will keep looking. If anyone wants to know why I am here, I will just tell them I am with the Jazz Band.

Hoffen opens the door to enter.

He: John, join us.

Weaver: Thanks Ming Fang, I am going to make sure the jazz band has everything they need for the Cell-e-Bration…don't you love that play on words? *He closes the door behind him.*

He: I like what you said about having to get away from the norm for change to occur.

Schubert: I think we have witnessed a change from the norm. Mrs. Hoffen, I see evidence that you are bridging gaps between yourself and the students in your classroom. I see evidence of bridges between the students and curriculum. This can potentially allow students to become motivated to direct their own learning and become activists for something they feel is a worthwhile cause for change.

Hoffen: Thank you Dr. Schubert. I want you to see firsthand the educational theory that I have embraced intersecting with my daily practice. I think I could guarantee fewer interruptions in our conversation if you could join me in my classroom. We can slip in the back. My inclusion teacher, Mrs. Robinson, is taking care of the class now. We can beam the Chicago team right in!

The group follows Mrs. Hoffen down the hall and enters the classroom. They walk to the back of the room, taking seats in a row of empty desks. Dr. He pulls up Skype on her computer.

Hoffen: Carry on…you people are doing a great job.

Robinson: Jhaymia, I believe you are next.

Jhaymia: I wrote a spoken word to represent Henrietta's pain. As a woman, cervical cancer could not have been an easy road to go down. Having to leave all of your family and friends behind because the fight was too much just sounds extremely painful. I didn't just write this because it was a project; I wrote it because I also know how it feels to lose a loved one to a deadly disease. Henrietta's family must have gone through a lot, losing a woman like her. She seemed to be very optimistic and uplifting. A powerful Black woman who stood for what she believed in and backed down for no one. When you hear the name Henrietta Lacks, normally you think of a woman who involuntarily gave her cells to science, but me, I think of a strong Black woman who opened many doors for the medical field. I really hope that you enjoy this spoken word. I called it "Henrietta's Immortal Wonderland."

~Henrietta's Immortal Wonderland~

There she stands, a beautiful woman just making her way across this beautiful wonderland. Where is she headed? She's going to find a way to make a change. There has to be a way for her to take this world and rearrange what cannot be. Henrietta Lacks? That's who we are. We are legion. Many. We are her story that can be passed on. Her freedom had been taken away. A piece of her had been used without her having a say in what she wanted to happen. Her pain still resides here. We still hear her cry out in our

hearts, and feel her tears wash against the palms of our hands. We can take her story and make it our own. We have the power to finally let her voice be heard! We shall make the ground shake with the heaviness of our hearts, and the sadness of her voice. Henrietta will not be silenced! She shall not be forgotten! No more will she be known as just another woman. She shall be known as the woman that gave life. The woman that cured diseases. The woman that saved the human race from all of the things that tried to destroy us. She saved the medical field. Most importantly, she saved us. Without her, the same sicknesses that existed back then would exist today. Henrietta Lacks is more than a woman. Henrietta is a hero. She is our hero. Lives are touched, the living are connected to science through meaningful stories such as *The Immortal Life of Henrietta Lacks*.

Hoffen: Mia, can you tell me why you chose the word Wonderland for your title?

Jhaymia: I think we have to have a new place to understand everything about Henrietta's story. Our old world had Henrietta in a public ward; the present world is full of problems, disease, issues with health insurance…In this new world—My Wonderland—people will get not only what it means for HeLa cells to be Immortal…but people will get to know and understand Henrietta. In my new world, Henrietta can be part of science…Not just HeLa—Henrietta! *She spins around, she has painted those words on a red t-shirt.* Now, Mrs. Hoffen please let Kyle do his rap!

Hoffen: I love the shirt. You have told us a wonderful story Jhaymia. Thank you so much. Kyle, are you ready? (*Hoffen glances nervously at her watch.)*

Kyle looks ghost white pale. He is holding a computer printout. His hands are visibly shaking.

Jhaymia: I will pull up your beat. *She walks to the computer.*

The music starts.

Kyle: I call this HeLa. *With a quiver in his voice.*

Old cells, still livin, I'm rappin bout science.

HeLa cells got labs and ethics and compliance

Ooo, but there is not an alliance.

John Hopkins took them cells—what an act of defiance

But it don't matter anyway

Look how it changed the game today

So many vaccines she led the way

Yea her cells never went a fray

Acting it out, but this isn't a school play

Ooo, Chick Chick Bang:

(Chorus)

You might just get hit with the HeLa

Sellin her cells away, but guess what she ain't the dealer!

She been gone for a while, I really wish I could meet her.

A history in the making a true science leader.

Now let's get back to the facts.

Born in Virginia to be exact.

Her real name is Henrietta Lacks.

Her cells deserve to make stacks.

Her tumor cells so strong not even a rock can make a crack

She is important to the world like fresh breath to a tic-tac. OOO

Shout out to her fam in Roanoke

Shout out to Henrietta for helping cure polio

Her Helix so fire is catch you with that okie dokee.

She is such a hero the fam should never go a broke

(Chorus)

You might just get hit with the HeLa

Sellin her cells away, but guess what she ain't the dealer!

She been gone for a while, I really wish I could meet her.

A history in the making a true science leader.

Switch it up

You might just get hit with the HeLa

Robinson: Wow Kyle! Great job! I think we have time for one more presentation. Charles, it looks like your card is on the top of the deck. *Charles shyly walks to the front of the room*.

Hoffen: Awesome Kyle! I wish I had that on video. Have you ever performed a rap before? I wish we had time for more discussion. (*She looks at Mrs. Robinson and then glances at her watch again.*)

Kyle: Well, uh no. I was kind of scared…but I really wanted to tell my story with a rap.

Charles: I will be honest, I had never written a poem before, but I liked Deborah's poem in the book. So here goes:

Henrietta Lacks

Struck with cancer you were

62 years ago may seem like a blur

What happened has caused quite a stir

Regardless, your story will be heard

To doctors you were just another cell

They didn't care about you or hope you would get well

Your spirit is gone earth was your shell

Now all we have left is your story to tell

In a way I think you would be pleased

To see all the smiles from the lives that you eased

From cloning, gene mapping, and polio vaccines

You have helped the sick and diseased

You may be gone, but your cells are alive

In millions of test tubes is where you survive

On this day is when you died

Immortal forever worldwide

Hoffen: Charles, I really like your final line…Immortal forever worldwide. Tell me about poetry. Is this something you would expect to be doing in Biology class?

Charles: Not really, I have never liked poetry in English class, but this seemed important. I thought it was a good way to tell Henrietta's Story.

Robinson interrupts Charles. Hoffen looks at Mrs. Robinson again and wonders why is she rushing our conversation.

Robinson: Alexis, you are up. *Alexis springs out of her seat and runs to the front.*

Alexis: Remember, Mrs. Hoffen let us work in pairs. *Lydia quietly joins her.*

Lydia: Well, we want to tell a part of the story that I have not heard anyone talk about. I want to talk about what it meant for Henrietta to be a woman in 1951.

Alexis: I am going to talk about what it meant for Henrietta to be a Black woman in 1951 in times of segregation and racism.

The bell rings.

Hoffen: Oh no…We never have enough time. *She sighs deeply, glancing sadly at her watch.* Class…it is lunch time…then show time. Alexis, we will hear from you in the program this afternoon. We will discuss your views after the program and in the next few days during class. Our important guests will be arriving for lunch. If you see them, help them find their place. Enjoy the music. Dance…Like Henrietta and her sisters on Saturday night!

The students pack up and leave Mrs. Hoffen and her committee to finish their discussion.

Hoffen: I must wrap up quickly this afternoon; our program will begin promptly at 1:00. I could probably call this my "wonderland." *She looks at the committee and the group seated in*

front of the computer screen. If a standardized curriculum is required, so be it, *she points to her colorful posters on the wall, which list the details of each standard.* I may be required to teach the standards, but I have a lot of control in how I teach the curriculum, and more importantly, how I teach my students.

First and foremost, I believe that students should be respected, and be considered curriculum makers right alongside the teacher. Skloot (2010) refused to see Henrietta Lacks or her family as "an abstraction" (Wiesel, 1992, p. ix). As an educator, I must refuse to see any students as an abstraction. By telling Henrietta's stories through poetry, songs, and letters, the students are able to keep Henrietta's story alive. I hope you see these work samples as evidence of the students' finding themselves, and their personal stories becoming part of the curriculum. Secondly, students should be taught "in a manner that respects and cares for their souls as opposed to a rote assembly-line approach" (Berry, 2005, p. 37). I want students to be privy to an education that requires "justice, democracy, and human rights" (Pinar, Reynolds, Slattery, & Taubman, 2008, p. 508). Students' success should not require them to abandon their defining characteristics: "ethnicity, race, and sex" (p. 304). Education should "cross borders and engage differences of culture, history, race, religion, and nation" (Asher, 2009, p. 9). Teachers must teach students, not just a standardized curriculum posted on the concrete block wall of the classroom. These objectives, carved in stone, do not include all necessary components of culturally responsive pedagogy. Oppression cannot be ignored. Opportunities involving discourse allow teachers to bring difficult subjects to the forefront of discussion. Without necessary discourse, students cannot make connections to those who are not like them. *The Immortal Life of Henrietta Lacks* will keep

Henrietta's story alive in the hearts and minds of all who hear. By keeping Henrietta's story alive, students can connect themselves to other stories, stories in which they can become participants or activists.

He: I think we are going to have to wrap this up. Thanks for coming, everyone. Thanks for Skyping with us. I hope the computer connection will hold for the presentation this afternoon. Now, I think we should all go and have some lunch. Margaret, I will report back to the committee and be in touch. I think your students summed up your practice very well, Margaret.

Hoffen: Thanks Dr. He.

John Weaver walks in the door as everyone heads to lunch.

Weaver: I can't believe I missed the entire meeting (*smiling*).

Hoffen: You have heard and read my work before…so you did not really miss anything…except the up-close and personal hostility of my coworker…and a few thousand interruptions. My students are very excited about today.

Weaver: Your students should be excited. They obviously find the curriculum in your classroom meaningful. I did not find Henrietta. So much for our theory.

Hoffen: Don't give up too fast. I swear she was real at Johns Hopkins. But, maybe it was my imagination. Does it really matter? It is obvious that she is alive and well here today. Look at these kids. Dressed head to toe in red, sharing her story, listening to her favorite music. Honestly, would she have to be a living breathing woman to become immortal? You go grab some lunch. I will see you in the auditorium. I need to go see if my sound

and lighting volunteer has figured out how to make the lightning strike the beaker of HeLa cells.

The stage lights begin to dim, as Weaver and Hoffen exit the stage.

Postscript: Interpretation of Noise and Interruptions

The purpose of this conversation was to discuss the elements of curriculum. I meant for the student interruptions to demonstrate how noise can interrupt curriculum and disrupt binary thinking. The dialogue created is an example of discourse, the most necessary element of a living curriculum. Using the text, *The Immortal Life of Henrietta Lacks*, lends itself to resurrecting life in science classrooms, by providing students with opportunities to connect their standardized curriculum to themselves. I begin by asking, how many of you have a special woman (mother, wife, grandmother, aunt, sister, cousin, or friend) in your life that you are close to? Thanks, next question: Have you ever been close to someone who experienced a horrible disease? Last question: Has your life or the life of a loved one been impacted by cancer? By this time everyone in the room has responded at least once…they notice that we all have a lot in common with Henrietta and her family. I think we will all connect to Henrietta in some way. Sometimes the connections are surprising.

I noticed early on, the first year that I used *The Immortal Life of Henrietta Lacks* during our Cell Cycle unit, that students found the story very interesting. The discussion was exciting. The questions were thoughtful. The emotions ran high as my students voiced their outraged concerning Henrietta being in a public ward, her cells being taken without her permission, and her family having no idea her cells were still alive. Henrietta and her family seemed invisible to science. A young man in my class, Matthew—you may remember him as the construction class

teacher—told me that reading about the Black scientists working in the HeLa factory was the first time he had ever read about African-Americans doing science. He said it made him feel good to know that his people helped to make a difference. I was saddened that this was the first example he had seen that he himself could become a scientist. "Science's rise to power supposes such a level of recruitment that soon, all-powerful, it creates a vacuum around itself. Which is the reason for the sudden decline of all the surrounding areas of culture—the humanities, arts, religion, and even the legal system" (Serres & Latour, 1990, 1996, p. 87). Science will not be developed fully if the "unusual gifts of race have not thereby been developed" (Woodson, 2005, p. 5). Race being ignored in science adds to making some individuals feel invisible or unimportant in the field of science. The narrator in *The Invisible Man* begins by telling us that "I am invisible; understand, simply because people refuse to see me" (Ellison, 1995, p. 3). All of our students in science should see themselves and others like themselves as participants in science. Without conversations concerning equity in science education, science education cannot move forward. What I propose may seem too simple… Teachers must build relationships with their students and create a space where the students can connect themselves to the science curriculum. These connections spark life into an otherwise lifeless curriculum. Once the connections are made, students have an opportunity to see themselves in the center of the curriculum as active participants. Active participants who can become activists and instigate change in our world.

CHAPTER EIGHT

STUDENTS JOIN THE CONSPIRACY AND WEAR RED TO HONOR HENRIETTA LACKS

The First Cell-e-Bration

On October 4, 2011, the Evans High School Multicultural Club and Evans High School Biology teachers and students invited the entire staff and student body of Evans High School to celebrate the life of Henrietta Lacks. The event was much like the activity going on in the background of Act VII. Henrietta Lacks died of cervical cancer at Johns Hopkins Hospital on this day in 1951. Henrietta Lacks may have died on this day, but her cells, called HeLa cells, are still living in laboratories all over the world.

On this first Henrietta Lacks Day, teachers at Evans shared information about Henrietta Lacks with each of their classes. We hoped that everyone would hear the story, find it interesting, and want to read the book for him or herself. Teachers received information to share with students. Everyone was invited to wear red and honor Henrietta Lacks by keeping her story alive. Staff members, Multicultural Club members, and Biology students each wore a sticker depicting the book jacket for *The Immortal Life of Henrietta Lacks*. In order to wear a sticker and red ribbon, one must be willing to share the story of Henrietta Lacks with anyone who asked about her. Random House provided permission for use of the book jacket on the stickers as well as the posters that were used throughout the school. Signs to remind students to "Wear Red in Honor of Henrietta Lacks" were posted around the school. Short excerpts from *The Immortal Life of Henrietta Lacks* were shared on the morning school television broadcast for several days prior to the event. During our lunch periods, music from the era when Henrietta Lacks lived and danced on Saturday nights was played in the school commons area. Dance tunes of Billie Holliday,

Duke Ellington Orchestra, Count Basie, Glen Miller, and Frank Sinatra were featured. Planning for this event started the very first day I heard about Henrietta Lacks. The students, teachers, custodians, lunchroom ladies, and administrators found Henrietta's story to be as amazing as I did on that day in June when my professor shared it with me. We have made this an annual event. On October 4 each year, the students and faculty of Evans High School don red clothing and share the story of Henrietta Lacks. I personally paint my toenails bright red to honor Henrietta!

This dissertation has chronicled my personal journey with sharing the story of Henrietta Lacks and the evolution of this doctoral inquiry. The journey has proven to be a swim in the middle of a raging river (Serres 1991, 1997). To begin the journey, I stepped off the shore, slowly, and eventually found myself in the middle of the river. I don't see this journey ending, or myself finding the other shore, with the completion of the dissertation and earning this degree.

The journey to find alternative pedagogies for the current standardized curriculum will continue. I want the required curriculum that I teach to grow and become a space where myself and the students I am privileged to teach can grow, seek change in the world, and become activists for a more democratic society. The required standardized curriculum must be elevated beyond the standardized requirements. I cannot and will not teach science in isolated factual segments that only last one class period. I hope to entice my students to join a conspiracy that will lead to lifelong learning and an immortal love for learning. The journey has involved many conversations and introduced you to many co-conspirators who want to bring about change in education. Starting with philosophers and historians of science and then progressing to university professors seeking to improve teaching and pedagogy provided for me a logical progression. I also believed it to be very important to bring the conversation to an actual school. Theory and practice must meet. But the most important aspect of curriculum and learning is what students

carry with them when they leave a particular educational setting. In this instance, the setting is a high school biology classroom.

Act VIII will focus on the Wear Red to Honor Henrietta Lacks event and the interactions involving teachers, students, scientists, professors, and of course, Henrietta Lacks. They include individuals highlighted in *The Immortal Life of Henrietta Lacks*. Other characters are represented as composites with fictional names. It is in the intersection of these vital participants that a curriculum is created. There is a mix of characters: students, teachers, scientists, professors, and of course, Henrietta. The characters are represented as composites with fictional names. Henrietta Lacks participates along with individuals highlighted in *The Immortal Life of Henrietta Lacks*.

Characters in order of appearance for all scenes: Alexis, Lydia, Henrietta, Matthew, Anthony, Kyle, Benji, and Jhaymia, high school students; Mrs. Delores Pequod, high school teacher; Mrs. Margaret Hoffen, high school teacher/graduate student, Dr. George Gey' research biologist; Mrs. Kubicek, laboratory technician; Deborah Lacks, Henrietta's daughter; Lawrence Lacks, Henrietta's son; school board members, Henrietta rising from the HeLa cells, and Henrietta as the mannequin.

Act VIII Scene I: Behind the Scenes

Act VIII is a continuation of the Wear Red to Honor Henrietta Lacks festivities taking place in the previous chapter. The events will culminate in a program to honor Henrietta Lacks. The stage is decorated with a Wear Red to Honor Henrietta Lacks banner. On the left of the stage is a wax statue of Henrietta Lacks. "Her name was Henrietta Lacks, but scientists know her as HeLa. She was a poor Southern tobacco farmer who worked the same land as her slave ancestors,

yet her cells—taken without her knowledge—became one of the most important tools in medicine. The first 'immortal' human cells grown in culture, they are still alive today, though she has been dead for more than sixty years" (The Lacks Family, 2010).

On the right is a student-produced copy of Pierre-Philippe Freymond's BioArt display (Senior, 2011). The school's art club duplicated this display for the schoolwide Wear Red to Honor Henrietta event. The art display consists of a giant neon sign that says "Henrietta's." This sign is hung above a small table holding a microscope, a beaker of HeLa cells, a small notebook that explains Henrietta's story in writing, and a copy of *The Immortal Life of Henrietta Lacks*. Two students, wearing red t-shirts, are standing beside the display.

Alexis: I hope the artist would not mind that this is not a real neon sign?

Lydia: I don't think so, the artist had the same goal that we have…share the story…honor Henrietta Lacks. Why a pink sign…I think red would be a better color?

Alexis: I really like seeing art and science sharing the stage. Most of the time poets, artists, and thespians like us get labels like geeks and freaks.

Lydia: Mrs. Hoffen says it will be the poets, the artists, and the thespians that make a real difference in this world. Since she is a science teacher you would expect her to say that science is more important than any of the other subjects. Remember what Mrs. Newton read to us in Lit the other day—"Yet again, lo! The soul above all science" (Whitman, 2001, p. 11). I think Whitman is saying souls are more important than science…the soul, the individual, humanity…must be an important factor when we do or study science.

Pequod: (*Walking quickly, she speaks to herself*) Looks like the pawn shop meets Biology Lab to me. I don't know who has time for all of this. I have got to write lesson plans today, analyze my benchmark data, and prepare students for their Milestone end of course tests, their SLO's and their final exams. That microscope should be in a cabinet before someone breaks it or steals it. Hey, don't touch that (*she yells*)…you break it you buy it. Don't you two have a class today? Shouldn't you be there? (*She rushes off the stage*.) You have been wandering these halls all day.

Alexis: But it is Wear Red to Honor Henrietta today. It all started when HeLa cells became the first cells to grow outside the body…*She walks toward the teacher, wanting to explain.* We set up the exhibit. *The student stops talking when she notices that the teacher is gone. She smiles and shakes her head and mouths—she has no soul—and turns to the other student.* Did you look at the HeLa cells?

Lydia: I did, when I was setting up the display. They are so cool. I know it is bad for a cell to have two nuclei—too much genetic information for the cell to handle during mitosis, but it does look interesting when you see it under the scope. "The cytoplasm is like a New York City street buzzing," remember (Skloot, 2010, p. 3).

Two young men come on stage and address the two young women.

Anthony: Hey, I think that is the first book I have read since 5th grade.

Matthew: This is just a great story. It really helped me understand what goes on in Biology class. My teacher explains it. But this story, Henrietta, makes it mean something to me.

Alexis: I want everyone to know her story. I mean anything to get Anthony here studying…oops…Don't worry, I won't ruin your rep…I promise not to tell anyone you stayed up until midnight writing your poem about Henrietta.

Anthony: *Blushing.* This is important. I like it. I will probably never forget how mitosis happens or how cancer cells look. Heck, I even know how different types of mutations can happen in cells: point, frameshift, inversion, deletion substitution….

Matthew: I liked learning about her family. Imagine all that Henrietta's kids went through when she died. Then to find out that their mother's cells were still growing all over the world. I wonder if there are any stories to make math interesting.

Lydia: Duh…Hypatia, Sophie Germain, Ada Lovelace, Sofia Kovalevskaya, Emmy Noether (Zielinski, 2011).

Anthony: Those are all women. I thought you were going to tell me Newton, or Einstein or guys who came up with String Theory and Chaos Theory.

Lydia: Duh! Women bring perspective to all fields, Anthony…open your male mind to the feminist perspective.

Matthew: Come on man, get in touch with your feminist side. It just means that you support that women are equal. All people are created equal and should be treated with equality.

Alexis: Mrs. Hoffen would be very proud that you two cavemen have crawled out of your cave into the light…but today is about Henrietta.

Matthew: I never expected to be discussing feminism or racism in science class. We studied syphilis in health class, but we never discussed the Tuskegee Syphilis experiments. All

those men died painful deaths…then there was Crownsville. Why would they pack so many people who need help under one roof? Today people with those same problems are able to live with their families and even come to school.

Anthony: Crownsville Hospital for the Negro Insane was overcrowded because of budget issues. It became about money, not people.

Lydia: I have never felt so fortunate to have the privilege of just being able to go to the doctor when I am sick. Poor Elsie was our age when she went to Crownsville. We have people with epilepsy that go to school. They just come to school with us. Crownsville was a horrible place. Thank goodness we have health care. Think about Henrietta, if it had not been for Johns Hopkins leaving all his money for doctors to set up a public ward, she would not have not received any medical care at all.

Anthony: What scares me is that Mrs. Hoffen says we could enter a new age of segregation because of the Human Genome project. Imagine being denied health care because you have a bad gene. Science is good…bad…all at the same time.

Lydia: Medical ethics got a wakeup call when Henrietta entered the picture. But we still have issues with people being treated fairly by science today. What was the guy's name with the spleen? *Mrs. Hoffen enters stage left.* Hey Mrs. Hoffen, what do you think?

Hoffen: *Rushes through*. I think it looks fantastic. Henrietta looks so real! *She does a double take, wondering…is she real?* You are all doing a fantastic job. I need to make sure the jazz band knows where to get their lunch. I will be back here for the program to start at 1:00 sharp!

Lydia: What were we talking about?

Anthony: John Moore. They decided that his spleen was not his. Once he signed a release form, science could do anything with his spleen that they wanted. Maybe we should actually read those forms the doctor asks you to sign.

Alexis: You better read. You better study. Education is powerful. It is all about waking up and smelling the coffee—finding as many connections as possible. *She pretends to head slap Anthony.* We are weavers. The ideas are threads…threads that intersect in a woven fabric, "fabric with brilliant threads throughout" (Krall, 1999, p. 5).

Lydia: Connecting science to history, culture, politics, society, and even philosophy is important.

Matthew: Don't forget people and their stories. *He pauses and looks into Henrietta's eyes.* She is very pretty. She was a wife, a mother, a daughter, a cousin, a friend…and her cells revolutionized medical science. "Henrietta Lacks should not have been on the ward because such a segregated space should never have existed" (Wald, 2012a, pp. 187-188).

Lydia: I agree totally Matthew—"and her family should receive state-of-the-art health care because such care should be a basic entitlement" (Wald, 2012a, pp. 187-188). *Lydia reaches up* and *touches her hand.* She is pretty, right down to those pretty red toenails.

Alexis: Are you guys going to paint your toes at the booth in the commons area?

Matthew and Anthony stick out their feet for the girls to see their painted toes. The students laugh.

Matthew: I told you they would not notice… Of course we painted our toes. We want everyone to know we think this story is important. We are taking a stand!

Anthony: In a very peaceful way!

Lydia: I can just imagine Henrietta and her sisters dancing on that hardwood floor every Saturday night.

Jazz begins to play in the background. The girls grab hands and swing dance. The boys join them. The lights fade.

Act VIII Scene II: Special Guests Arrive

Ms. Mary Kubicek and Dr. George Gey enter, stopping at the HeLa display first.

Mrs. Mary Kubicek: I am glad we have a few minutes before lunch. Did you see the jazz band setting up? I wonder if these kids know how to swing dance?

Dr. George Gey: I saw the band setting up, I think we are in for some excellent entertainment…these students have done a lot of work.

Kubicek: This mannequin looks so real. She is stunning. I will never forget seeing Henrietta in the morgue, that day you sent me to get the last samples of those horrible tumors. I could only look at her chipped nail polish…The students did a great job…look, George, they even painted her toenails red…that is why they call this "Wear Red to Honor Henrietta." When I saw those nails, all those years ago is when I realized "that all those cells came from a real person" (Skloot, 2010, pp. 90-91).

Gey: I never knew one sample of cells could create so much science, so many wonderful discoveries: Help cure polio, help cure cancer. Then came in vitro fertilization and cloning. The story has also created a lot of controversy. I just wanted to rid the world of cancer. We had to have cells to work with outside the body. Margaret and I were not in

science to make money, we just wanted to help people…all people… Scientists did not get signed consent at the time for samples.

Kubicek: You are preaching to the choir, George. Remember I was there. The world should have known you had good intentions…I mean you…we… worked in a basement, for goodness sake. Cell lines and cell shakers did not need patents in your mind.

Gey: I hope these kids do not see me as a villain today when I tell my part of the story. I thought I was doing the right thing when I did not release her identity. I kept it a secret…I guess, until Science had to know.

Kubicek: I remember when Stanley Gartler dropped that "HeLa Bomb" at the Chicago meeting (Skloot, 2010, p. 152). I could not believe the genetic tests of those 18 cell lines myself. They should have all been different cells, different donors. I know that shocked everyone who had worked with Henrietta's cells. Funny, I have a hard time calling them HeLa cells now. I can't believe how Gartler described her—she was a cancer victim. Her cells were in the lab. The cells caused the problems. Those cells could travel on dust particles…how is that any fault of Henrietta's? As a lab technician, I say it was all due to sloppy technique and carelessness. I don't think it is right to personify what the cells are doing onto the donor. She was a real person who should be respected. Henrietta, not just HeLa, I often say. She was a real person. Why would you speak ill of a woman you never met? A woman who was raising five children, only to be struck down by cancer. A vicious cancer. She was a victim of her own cells. I suggest keep the two separate. Or can we separate them? The cells and the woman. *Kubicek looks confused.* Maybe Gartler

would have been more compassionate if he had seen her lying on that table, with all those tumors… I am ashamed to say I had to look away. That was when I noticed her toes.

Gey: Years of research were ruined. I am sure Gartler did not want to be the one to report the problem. I am sure he thought they would laugh him off the stage.

Kubicek quickly cuts him off.

Kubicek: Reporting the problem was not the issue…how he racialized the whole story…calling the cells promiscuous. The story of a Black woman's cells was told using the racially charged, stereotypical language of the time. Think about it. Would we have HeLa cells growing in culture all over the world if I had not been such a conscientious technician? Think about DNA. Without a woman—Rosalind Franklin—Watson and Crick would still be moving around the pieces of that DNA model. Some scientists would still be spraying people with DDT to keep them from getting polio, if it were not for Henrietta and her cells (Carson, 1962).

Gey: I see your point. Nobody wanted to unleash that story to those researchers that day in Chicago. But today we celebrate. I even wore my red tie. I was glad the Lacks family was able to keep Henrietta's genome private. I am glad that scholarship money has been made available to Henrietta's children. We have made attempts to move forward…but honestly, I think we have a long way to go. I guess if I could go back, I would give more thought to her family. I thought privacy was best.

Matthew approaches Kubicek and Dr. Gey.

Matthew: Hello. Are you Mrs. Kubicek and Dr. Gey? Mrs. Hoffen sent me to find you. She would like you to come find your seat for lunch.

Kubicek: Yes we are. You students have done a fabulous job here. I really like the BioArt display. It is nice to see Henrietta honored.

Matthew: Hmm. So you're the ones that took the cells, kept the cells a secret.

Gey: I did take Henrietta's cells. Mary here grew them. I know now that Henrietta's family should have been included more in the process. That mannequin looks very real.

Matthew: I know. I have this feeling that Henrietta Lacks is right here on this stage. I think she would be happy with our plans for the day. We better go find our places. I think I hear the music.

Act VIII Scene III: Members of Henrietta's Family Arrive

Deborah and Lawrence Lacks walk slowly onto the stage.

Deborah Lacks: Oh, Mama! *She rushes to the mannequin, holding the wax figure's face with her hands and acting very excited.* Lawrence, doesn't she look real? Don't you think I have her eyes?

Lawrence Lacks: She is beautiful. I cannot imagine how painful her cancer was. I remember everything about her, her face, how she smiled. She smiled most of the time, unless I was in trouble. I do know she probably would not have complained. She was always helping people. She would be happy that her cells helped. I am glad that now we can decide who can use her cells and who can't. She would not want her cells used for the wrong reason…and they were her cells.

Deborah Lacks: I wish I could remember her. Let's look at the cells. *They walk across to the microscope*. Lawrence, I can remember how excited I was when Rebecca took me to the lab to see the cells. Dr. Christoph was the person who really cared enough to tell us the whole story. I did not know what it meant when they said they had my mama's cells in a laboratory. Why didn't they tell us?

Anthony and Matthew enter.

Anthony*:* Would you like me to show you how to focus the scope?

Deborah peers into the scope, while Anthony narrates how she should focus it.

Deborah: There they are!

Lawrence Lacks: I always thought it was just about the money…somebody trying to get rich. I am not sure. Like Rebecca Skloot told us and her readers, Science did not have to ask for permission to take samples at the time. Unfortunately, it was a time when racism was rampant…public wards, those patients in the public ward being used for experiments. Can you imagine if all those rich people who could afford to get the polio vaccine before it was given to everyone would have known that their cure came about because of a Black woman in the colored ward of Johns Hopkins Hospital? You know mama could find good in anything. She would know all of that was wrong but she would be glad that George Gey decided to let a group of African-American scientists take care of Henrietta's cells. This decision paved the way for African-American scientists at the Tuskegee institute to become a voice in science. Although I find it ironic that the Tuskegee Syphilis experiments were going on down the hall.

Matthew: I got excited when I learned that African-American scientists played an important role in science at the "HeLa factory" (Skloot, 2010, p. 93). We learn about famous scientists, but not many of them look like me. I shared this with Mrs. Hoffen. She sent me to a website so I could see a list. Science is evolving! The list has scientists from all cultures, and many women scientists. Science today is not just white men wearing white lab coats like it was when Henrietta was alive. Science is people, men and women, working together in many different fields…it's…what is that word I am thinking of?

Anthony: Interdisciplinary. Science is not just science. Science is history, philosophy, art, literature, humanities, politics, culture…and more!

Alexis enters stage right and walks to the table holding the microscope.

Deborah Lacks: I hope that what happened to us never happens to another family.

Alexis: Hi, I am so excited to meet you Mrs. Lacks, Mr. Lacks. Mrs. Hoffen asked me to come find you. Lunch is ready! Guys, can you walk our guests to lunch? And then come back to help me with the chairs for the school board and all the other dignitaries…then we will be ready.

The four leave the stage.

Alexis*:* Where are those chairs? Henrietta, you stay right there. I will be right back to help you move right over there…stage left.

Alexis goes backstage and returns with two chairs, to find the mannequin in a new place.

Alexis: Lydia? Anthony? Matthew? Where are you guys? You guys… How did you get there, Henrietta? One of the guys must have moved you. I better get to lunch.

Lights fade.

Act VIII Scene IV: The Program Begins

It is 1:00 p.m. and the auditorium is starting to fill up. Teachers are bringing in groups of students to sit in designated areas. Several students are helping the special guests find their seats beside the podium. Mrs. Hoffen walks to the podium on the side of the stage opposite the art display. Henrietta stands to the left of the podium. Everyone is in place. The sign in the art exhibit is glowing over on the right of the stage. The audience hears a crash of symbols. A spotlight picks up a young man entering the back of the auditorium. A hip hop beat fills the auditorium. The young man begins to rap.

Benji:

There once was a man named Georg Gey

He started doing science like Bill Nye

He was stealing cells from people on the sly

He could've asked but I guess he was too shy

Stealing cells? He's up to the task

Opens up the door and puts on a doctors mask

Took the cells, then it's back to the lab

Making money off HeLa, yeah, he's rolling fat

HeLa was on Earth but gone too fast

Looked on her different because she was black

Don’t believe me, well it’s a matter of the fact

(hook)

Now let me tell you about a woman named Henrietta Lacks

Got her cells on file, we got em by the stacks

So many cells we should start stacking racks

So listen to this story

Because it’s about her past

Her story is as simple as can be

She was an average person like you and me

Went to the doctor and paid a fee

What he told her, she could not believe

He said: you got cancer and it’s at stage 3

But then he said let me run a test

See this is the part that I detest

He took her cells and you know the rest

Then he took credit like he was the best

Maybe he simply wanted to protect

Now let me tell you about a woman named Henrietta Lacks

Got her cells on file, we got em by the stacks

So many cells we should start stacking racks

So listen to this story

Because it's about her past!

The audience breaks out in applause and whistles. Then they hear a loud clap of thunder and see lightning strike the art exhibit on the stage. The neon pink sign flashes. The beaker tips over. The audience hears the glass break and a strange bubbling sound. As the light spreads, the audience can see a shadowy figure kneeling with arms wrapped around the knees. There is a gasp. A spotlight also shines on the shadowy figure where the lightning struck and the glass broke. The applause ends and the spotlight shifts to Alexis, standing on the stage behind the podium.

Alexis: Thanks Benji for sharing Henrietta's story with your rap. A lightning bolt, a flashing sign, and a figure growing up from the cells. Our art exhibit is just one way that we will tell the story of Henrietta Lacks today. The display includes her famous cells, and a picture and booklet highlighting her life. Our work here was inspired by the artist Philippe Freymond (Senior, 2011). This BioArt exhibit was Freymond's way of telling Henrietta's story. He wanted to show Henrietta's cells and Henrietta as a person together in one piece of art. You will notice that Henrietta has come to life from her HeLa cells. We want you to notice that Henrietta is being resurrected from her HeLa cells today. Keep an eye on Henrietta as we tell her story. In Mrs. Hoffen's class over the last few weeks we have

been sharing Henrietta's story through a medium of our choice: art, poetry, letters, science fiction, songs, and many others. We hope that by sharing the story of Henrietta Lacks with all who are here we can keep her story alive. We hope that we can show how stories can be important to learning science.

Hoffen: Thank you, Alexis. Welcome to our Wear Red to Honor Henrietta Lacks event. Today is a day for storytelling. It is also a day when we take a serious look at our science curriculum and ask an important question—Can Henrietta Lacks become part of this high school science curriculum? Welcome to everyone who has found time to attend this cell-e-bration of Henrietta's life. First, I want to introduce Henrietta's daughter, Deborah Lacks.

Deborah Lacks: Thanks so much for inviting me. It is such an honor to be here.

Hoffen: Next, we have Henrietta's son, Lawrence Lacks

Lawrence Lacks: Thanks so much for inviting us, Mrs. Hoffen. As my sister said, it is a real honor to be here. I am so glad you all are sharing our mother's story.

Hoffen: Our visiting scientists today are Dr. George Gey and his lab technician. Ms. Mary Kubicek. It was in their lab that HeLa cells began to grow for the first time

Both Dr. Gey and Kubicek smile and wave to the audience. Mrs. Hoffen continues.

Hoffen: I also want to welcome our distinguished school superintendent and our current school board members. *The members smile and wave.* You all have a program. We are going to begin today by telling you a story. If you would all just come to the podium when it is your turn. *The students on the back row stand up and form a line behind the podium.*

Matthew: "She was a poor Southern tobacco farmer who worked the same land as her slave ancestors, yet her cells—taken without her knowledge—became one of the most important tools in medicine" (The Lacks Family, 2010).

Lydia: On January 29, 1951, Henrietta went to Johns Hopkins Hospital. "I got a knot on my womb," she told the receptionist. "The doctors need to have a look" (Skloot, 2010, p. 13). The doctor found the tumor exactly where she told him he would.

Anthony: A sample of this tumor was taken to Dr. Gey's lab in the basement of John's Hopkins Hospital. Mrs. Mary Kubicek (*Anthony and Kubicek exchange a smile*), Dr. Gey's lab technician, fresh out of college, handled all the tissue samples that came into the lab. Kubicek labeled Henrietta's sample—He, the first two letters of her first name, and La**,** the first two letters of her last name.

Alexis: When looking at Henrietta's records, it was noted that three months prior to this appointment, no tumor had been detected following a six week return visit after the birth of her fifth child. The doctor noted that either they had missed the tumor…or it was growing at an incredible rate.

Anthony: After two days, Kubicek was shocked to find that cells were growing. She was even more shocked at the rate they were growing. HeLa cells were growing 20 times faster than normal cells. Mary Kubicek had her hands full taking care of all these cells. Dr. George Gey decided to share with anyone who wanted to work with the cells.

Matthew: After a painful bout with cancer, Henrietta Lacks passed away at the Johns Hopkins Hospital on October 4, 1951.

Lydia: Dr. Gey's lab assistant was sent to the morgue where Henrietta's autopsy was taking place to get a "final sample of cells" (Skloot, 2010, p. 90). *Lydia smiles and gestures for Kubicek to move up to the microphone.*

Kubicek: [I] wanted to run out of the morgue and back to the lab, but instead, [I] stared at Henrietta's arms and legs—anything to avoid looking into her lifeless eyes. Then my gaze fell on Henrietta's feet, and [I] gasped: Henrietta's toenails were covered in chipped bright red polish" (Skloot, 2010, p. 90). Mary continued:

> When I saw those toenails, I thought, oh jeeze, she [is] a real person. [I] started imagining her sitting and painting those toenails, and it hit me for the first time that those cells we'd been working with all this time and sending all over the world, they came from a live woman. [I'd] never thought of it that way. (pp. 90-91)

I could not imagine how much she had suffered. She was on that cold table, her body full of tumors. She was just another statistic who died in the public ward. Here I was a white woman, staring at her lifeless black body. A body deemed less than human by society. She could not just be a woman. She was a Black woman in the public ward. As I stood there I became very aware of my personal white privilege. I was able to get a college education. I had a job in a major research facility. If I had been sick, I would have been treated in the private patient ward with no expense spared. She was a real woman. Not just HeLa. Not another Black woman in the public ward. She was Henrietta Lacks. I have to wonder how many of us would be alive without her. I will let Dr. Gey tell that part of the story.

Dr. Gey: I think her story has touched everyone that hears it. Over the next few weeks, we were amazed that the cells were still living. We were afraid they would stop. No one wants to be embarrassed by their experiments. I went on television to make the announcement. Everything happened so fast! The rest is history. History that I think everyone in a science class should study. HeLa cells led us to a polio vaccine.

Alexis: This is a story about science and how it isn't always what we might think it is. Our teacher began our introduction to the story by reading this passage. Since this is where the story started for me, I want to read it to you. (*Alexis picks up a copy of* The Immortal Life of Henrietta Lacks *from under the podium*):

> Under the microscope, a cell looks a lot like a fried egg: It has a white (the *cytoplasm*) that's full of water and proteins to keep it fed, and a yolk (the *nucleus*) that holds all the genetic information that makes you. The cytoplasm buzzes like a New York City street. It is crammed full of molecules and vessels endlessly shuttling enzymes and sugars from one part of the cell to another by pumping water, nutrients, and oxygen in and out of the cell. All the while, little cytoplasmic factories work 24/7, cranking out sugars, fats, proteins (*she pronounces the word as* pro teee ins), and energy to keep the whole thing running and feed the nucleus—the brains of the operation. Inside every nucleus within each cell in your body, there's an identical copy of your entire genome. That genome tells cells when to grow and divide and makes sure they do their jobs, whether that's

> controlling your heartbeat or helping your brain understand the words on this page. (Skloot, 2010, p. 3)

Mrs. Hoffen told us about the cytoplasm being as "busy as a New York City street" (Skloot, 2010, p. 3). We thought we would just be seeing parts of the cell defined in a novel. She would tell us stories and we would learn about science. I had always thought science was just about things like the laws of motion, mitochondria, and body systems…atoms.

As the story of Henrietta Lacks is being relayed to the audience, it appears that Henrietta is rising up from the spilt HeLa cells. Henrietta is on her knees now, with her arms stretching over her head. Like someone waking up in the morning, taking in deep breaths.

Anthony*:* "All it takes is one small mistake anywhere in the division process for cells to start growing out of control., just one enzyme misfiring, just one wrong protein (*pro tee in, he smiles at Alexis*)" (Skloot, 2010, p. 3). I was able to teach my construction class what a cancer cell looks like compared to a normal cell.

A board member looking disgruntled interrupts Anthony.

Board Member 1: Anthony what is the difference between them?

Anthony: A normal cell has one nucleus. Think about an egg you would cook for breakfast. Most of the eggs, if not all the eggs, you have cracked in a lifetime have one yolk. Normal cells have one nucleus, similar to how most eggs have one yolk, but a cancer cell can have multiple nuclei—like an egg with two yolks.

Board Member 1: Mrs. Hoffen, our county has a very strict curriculum map. Where in the map does this work with Henrietta Lacks fall? Unless I am mistaken, I do not see her name in the standards for your course.

Henrietta's arms fall; she begins to support her weight with her hands.

Hoffen: Our unit on cells is a huge part of the curriculum. I teach my students about Henrietta Lacks while they are learning about cells. This learning can convey what's covered by the standards but goes beyond that as well.

Henrietta's arms stretch above her again; she begins to breathe deeply.

Board Member 2: Shouldn't your students be doing more activities to prepare them for their Biology Benchmarks? Their End of Course Test?

Henrietta's arms fall; she begins to support her weight with her hands.

Board Member 3: Science has nothing to do with justice, democracy, or human rights. Science is the pursuit of truth and understanding through a trial of experimentation and verifiable and repeatable results. Do your students carry out experiments with HeLa cells, Mrs. Hoffen?

Alexis: (*very agitated*) Didn't you listen to us? Science is so much more than just experiments. Don't get me wrong. Experiments are important. I know how important it was for scientists to experiment with HeLa cells to find vaccines, and cure cancer. But science is history, art, poetry, philosophy, culture, stories. Henrietta and her story are an important part. How can we learn about HeLa cells and not learn about Henrietta?

Henrietta's arms stretch above her again, she begins to breathe deeply and rise to one knee, like she is going to stand up.

Board Member 3. Science is a matter of experimenting to collect new data and make knew knowledge. How many formal lab reports do you have your students write? Do your students know each step of the Krebs cycle, can they draw all of their amino acids, and can they even draw a simple atom? Do they know their R-groups?

Matthew: "The Universe is made of stories not of atoms" (Rukeyser, 1968, p. 111).

Henrietta's back arches, she pushes her foot under her and begins to stand up.

Alexis: "We must not see any person as an abstraction. Instead, we must see in every person a universe with its own secrets, with its own treasures, with its own sources of anguish, and with some measure of triumph" (Wiesel, 1992, p. ix)**.**

Lydia: By studying the story of Henrietta Lacks, we are able to learn about cells in a different way. We still learn the basics of science, but it is just more interesting. I know we will all do great on our test.

The restless board member looks as if he is about to speak again.

Hoffen: Thank you, ladies and gentlemen. Sir (*she says sternly*), "Standards prescribed by governing bodies may serve as guides and represent expectations, they do not reflect a comprehensive understanding of individualized needs and certainly do not account for what happens in classrooms as children problem-solve and interact with their learning" (Schultz, 2008, p. 11). And furthermore: "Knowing is a human way to seek relationship and in the process, to have encounters and exchanges that will inevitably alter us. At its

deepest reaches, knowing is always community" (Palmer, 1998, p. 55). Think about how your body is constructed. Do you remember the term connective tissues? Knowledge must be connected to something else. You could use the word build, construct, connect...all would apply. Students are able to remember what they learn about cells because the information from the standardized curriculum is connected to something else. In this case a story. A story about a real woman, whose cells changed the world, the course of modern medicine as we know it today. *The board member sighs and decides that he will not continue his current line of argument.* Anthony, why don't you read your poem?

Anthony: *Begins to speak nervously.*

The Tale of Henrietta Lacks

Little girl born in Virginia,

Just a little bit north of Carolina,

She grew up as a nobody

She died a nobody

But was later found as an everybody

Being diagnosed with cancer,

She donated cells without asking why

She died with a silent cry.

However sad, she became our answer,

Mankind's solution

To all the diseases and illnesses,

Henrietta Lacks is our evolution.

She made vaccines and medicine possible

She made life plausible.

HeLa, the immortal cell line,

Population still in the incline.

HeLa, the nobody,

Became HeLa the everybody,

That HeLa saved mankind

Now we see that she is not just HeLa

She is Henrietta Lacks

Forever and ever etched in my mind.

The audience applauds. Henrietta is standing, ready to take a step.

Deborah: Can I read my poem now?

Hoffen: Sure Deborah. This would be a great time. Ladies and gentlemen, please welcome Deborah Lacks, Henrietta's daughter.

Deborah Lacks: *Looks at her notes, and then looks out to the audience. She begins slowly.*

cancer

checkup

can't afford

white and rich get it

my mother was black

black poor people don' have the money to

pay for it

mad yes I am mad

We were used by taking our blood and lied to

We had to pay for our own medicine can you believe that?

Johns Hopkin Hospital and all other places,

That has my mother cells, don't give her

Nothing. (Skloot, 2010, p. 280)

My name is Deborah Lacks and I am Henrietta's youngest daughter. It is important that students learn all they can. They don't need to just learn from textbooks. Sometimes textbooks are hard to understand. They need someone to teach them and show them why all that textbook stuff is important. Dr. Christoph at Johns Hopkins cared

> enough to show my family our mother's cells. He explained what a cell was. He let us look at the cells through a microscope. I thought they were so beautiful. Just like her. To me she was not just HeLa. She was my mother: Henrietta Lacks. It sure was a shock to find out her cells were living after all those years and to find out that "[My] mother was on the moon, she been in nuclear bombs and made that polio vaccine. I really don't know how she did all that, but I guess I'm glad she did, cause that mean she helpin lots of people. I think she would like that." (Skloot, 2010, p. 9)

Henrietta is standing now. Music begins. Lydia stands at the podium and begins to sing to the tune of Owl City's Fireflies*. Henrietta dances to the music on the dimly lit stage.*

Lydia:

Solo

You would not believe the life,

For it was painful and caused some strife,

Of a lady named Henrietta Lacks

Cervical cancer took over her life,

And because she was a Black woman, wife

She couldn't get the care she needed.

Chorus

I want everyone to see…

That she matters to me

It is hard to say if we could have made the polio vaccine without her, it might've been just a dream

She wasn't what she seemed

Solo

In the year 1951

African-Americans were widely shunned

So she had to go to Johns Hopkins hospital

They robbed her of her cells

From the tumors that had begun to swell

And grew them in a lab for years…

Chorus

I want everyone to see…

That she matters to me.

It's hard to say if we could have discovered cloning

Without her it might've been just a dream

She wasn't what she seemed

The scientists got rich…

(Please remember her name…)

But her family didn't get a cent…

(Please remember her name…)

Why do they not tell them?

(Please remember her name…)

That her death was not in vain

Ten million reasons why

Her family spend lots of nights

Crying over their late mom

If they could see her now

She'd make her family so proud

Saving lives not unlike her own

Solo (*slowly*)

I want everyone to see

That she matters to me

If only we'd remember her name

And bring her glory and fame

If only we'd band together and spread her name…

Henrietta, Henrietta, Henrietta Lacks

The music and dancing end and the lights fade.

Act VIII Scene V: Curtain Call

Alexis: We want to close with a spoken word. These are the words of our teacher Mrs. Hoffen.

> We hope by hearing all the different versions of Henrietta's story today, that you can create your own story…connecting yourself to Henrietta. Remember "everything and everybody has a story" (Baszile, 2008, p. 253). "We bring all our sorted histories, hopes, and desires to the project of curriculum theory, hooking onto familiar stories and creating new ones" (Baszile, 2010, p. 483).

All characters come on stage and make a semi-circle. There is a student on each side of the mannequin and the dancer remains beside the art exhibit. The students begin to chant.

Standards posted on a brick wall, Rubrics, lesson plans, curriculum maps,

Teachers perform on cue, scripted, prescribed, outcomes predetermined,

Students bubble answers to questions that matter little—Isolated facts, tiny memorized details

Curriculum in dire need of restructuring, revisioning, resurrection

Characterized not by a list of lifeless facts but ideas of Personal, Cultural, Social, Global relevance

Personal Passionate Participatory for all

Pushing Boundaries Crossing Borders

"Inspiring nerves and skin to learn, to remember,

Engaging in ongoing conversations, taking action in our worlds" (Miller, 2005, p. 208)

Science and social justice taught side by side,

Transformative for teacher, student, and society

That is the dream

Reality as we know it insists

No time for stories…No time to go off map, no time to discuss, no time to explore

The blank stares on their faces she deplores

Her heart screams

Day after day instead of growing and going deep—we hover but a moment before moving

VIOLENTLY to the next objective

It is 3a and 3b whether or not it is relevant to me—relevant to him or her

Detached, empty, isolated

Empty space between the three…the students the curriculum and me.

Could stories fill the gaps? Could stories create cracks in the standards posted on the concrete wall?

Science Stories, student stories, teacher stories

Stories told in the classroom stories told in the halls

Parts of the cell we know it well—we even know about HeLa cells—

He for Henrietta La for Lacks…no one knew where the cells came from…

The real woman fell through the cracks—ignored, invisible, nameless, faceless.

My story, their story, all untold, unspoken—Like Henrietta's until now—

She scurried into the hospital, past the "colored" bathroom

Tumor, radiation, Cells robbed

Cancer treatment in return for experimental participation owed

25 year wait for precipitation of a name, of a person, of a real woman with a real family

Should the story remain untold, is there time? Must we Speak of her HeLa cells and move on

NO

October 4th don your red shirts to honor Henrietta

Discourse to follow will spin your head

Thinking, reading, writing, talking too

Finding out that it matters who

Science without isolation, Science class with transformation

Social Justice takes the stage, standards on the wall start to fade

Students becoming activists, fighting for social justice.

Full-blown assault on the all-powerful institution of science.

Students discussed the importance of cells; saw fit to talk about the injustice suffered by Henrietta

Suffered by her family.

What if she had not been Black?

What if she had not been a woman?

What if she had not been poor?

Conversations to follow in class—medical ethics, civil rights, racism, sexism, and violations of basic human rights

Students become the voice of Henrietta—Keeping her story alive

Can this be measured by an end of course test?

Teach to the heart and to the soul—of each one

Noting each special face

Creating each a special space

A space where all participants are privy to social justice

A space where bridges are constructed

The cells and their functions, the real woman too

Why can't both be worthy to note,

The real woman, Henrietta, with chipped red polish on her toes

Come sit, converse, as we compose our story verse by verse

Together we write a story—the philosophers, historians, teachers, students, the curriculum,

And of course Henrietta!

Everyone on the stage takes a bow, including the mannequin. Shock fills everyone's faces. She takes a step forward and begins speaking; this was not how their ending had been rehearsed.

Henrietta:

Still Alive

With open eyes I see, everything being done to me

As I lay unconnected and detached from reality

I feel their piercing sharp needles press against my anatomy

I'm being robbed of my identity

These "miracle cells" are a part of me

"You can't take them away!" I wish I could say,

But I have no choice

Why must I go through so much agony?

It is already hard enough being a Black woman in society

I must stay strong for my family.

They are all that's left of me

I did not consent to this,

So why must I be forced to face this fatality?

I've been kept in the dark, for what seems like an eternity

And still nothing has changed

No one has heard of me

I'm a real human being, not just a cure for disease

At least share my story if you're going to steal a piece of me

Doctors kept me a secret,

While my cells were healing the rest of humanity

Covering up who I was

To patronize their unrighteous acts of thievery

What they did will never be right

However, this new generation can put up a fight

You can keep my story alive,

By simply whispering my name,

I will live on.

My name is Henrietta Lacks, but the world for such a long time only knew me as HeLa. Thank you all for coming here today to tell my story. There are others with stories that need to be shared. Each of you have your own story to write and tell. Together we weave our stories together in hopes of creating a better world.

The stage goes dark, the curtain falls. When the backstage lights come up, the mannequin is nowhere to be found. The audience reacts with a gasp. Everyone in the audience seems to think this is part of the show. They begin to walk to the exit. Cast members are greeted with bouquets of flowers. The students are in shock. Was Henrietta pretending to be a mannequin? Did we really see her bow? Did she really speak? Will she become part of science? That is up to the audience members themselves. Will they create their own story and include her? If they create their own story including Henrietta, will they share this story? Will becoming an activist to share stories like Henrietta's become embodied at their very core of being? That story is yet to be told.

Act VIII Scene VI: A Walk with Henrietta

Margaret Hoffen runs backstage. She looks in the dressing rooms. She calls for Henrietta.

Hoffen: Henrietta. Henrietta. Where are you? Please don't go. Please wait.

Hoffen sees a shadowy figure at the end of the hallway.

Hoffen: Wait. Please talk to me

Henrietta Lacks: I understand what you are trying to do, Margaret. But what is the point? I was just a woman in the public ward. Lucky me…I had wonderful spectacular cancer cells**.** I am glad they have helped millions.

Hoffen: You don't have to go away. Your story will be kept alive. People are understanding that you are not just HeLa. You must have thought this would be a good place to be. You traveled a long way to get here. Can we just take a walk? Can we talk?

The two walk out of the hallway door and out onto the sidewalk that surrounds the building.

Lacks: Do you know how hard it was for me to be right there with my family? I was not sure what to do. The program lured me into thinking that I was actually alive, and that I could be a part of real conversations. I actually felt alive. What would the consequences be for my family if I were to simply show up again? Who knows when I will melt back into the puddle from which I rose?

Hoffen: The lightning strike. You rose up from the cells. I knew it. This is crazy. I don't know where to start.

Lacks: Why won't you call me HeLa like everyone else? This story cannot have a happy ending. No matter how many times you say…Henrietta is a real person with a real family, it will not change what has happened. Don't you understand that I am not the only person with a story? My family is not the only family that has witnessed a family member's commodification and exploitation for the sake of science.

Hoffen: I know there are others.

Lacks: What are you going to do about the others, plan a program to honor them too?

Hoffen: I know there are other stories. If my students learn one example, it is my hope that they can apply what they have learned to a new situation. If they understand how your cells were taken, they might become open to listen to stories of others.

Lacks: Hope. You seem to have hope for everything. Your students seemed able to look at my story with different perspectives. So much of what happened is now known. I saw George Gey sitting there. He really thought he was doing the right thing at the time. But today, in 2015, we still have people being exploited for the sake of science.

Hoffen: What is it that you want to happen Henrietta? What would make things right?

Lacks: For starters, I want science to take care of my family. They should have "health coverage" like your professor suggested (Weaver, 2010, p. 22). Secondly, I want to make sure those crazy scientists do not do anything to hurt anyone with my cells.

Hoffen: Do you know your family has the right to how your cells are being used (Skloot, 2013)? Also, Rebecca Skloot has worked very hard to make sure your family's genetic privacy has been maintained.

Lacks: I was not trying to be sarcastic about you always having hope. You seem to have acknowledged that it is easier for some to have hope. Don't let me or anyone else take your hope away. You have to teach your students how to have hope of a better future. That will be difficult in a world plagued with war, violence, poverty, racism, sexism, disease, global warming, climate change…and I could go on.

Hoffen: I know my privilege does make it easier to have hope. I have so many opportunities at my fingertips—education, health insurance, a great job!

Lacks: It will not be easy for you to convince all of those students to take advantage of what is being offered to them. Some of them are just hard headed kids. I know what hard headed kids look like. I was in the process of raising 5, remember. *Henrietta chuckles*. That little girl Alexis running around is a spitfire. She has your hope. She is determined to change the world. Yeah, I spoke with her when I came into the building. She told me all about me! She was very sweet. I bet you have trouble keeping her in her seat. She gave me these beads. *Henrietta took a string of shiny red Mardi gras beads from her suit pocket and places them over her head. She reaches up and grasps the beads.* You are right Margaret. My story will continue to live here. Not everyone will want to hear my story. A few will. It will be through those few that I will continue to live. Thank you.

Hoffen: Don't thank me. Learning about you and your story has changed my life. If your cells can go to the moon and save millions of people from polio, the least I can do is come to work every day and share your story. Thanks for talking to me.

Lacks: I know clones don't have the life expectancy of other organisms. That is all I am today. This sabbatical from my grave will end soon.

Hoffen: Henrietta, is it true you can control stuff from the grave? Were you the reason Dr. Weaver got stuck in Virginia?

Lacks: *Laughing.* Stuck with Cootie. That was pretty funny. I bet that dear cousin of mine talked your professor's head off. The man always has cold drinks in his fridge. I could use one about now.

The two continue walking into the shadows. Alexis comes running out the back door of the school. Yelling loudly.

Alexis: Mrs. Hoffen Mrs. Hoffen. Where are you going? It is time for the cast party.

Hoffen: I was just walking out here.

Alexis: Walking and probably shooting the breeze with Henrietta.

Hoffen: What are you doing out here?

Alexis*:* I could not let you miss the cast party. Everyone is waiting on you. You have to be the one to cut the HeLa cell cake!

Act VIII Scene VII: Chemistry Lab down the Hall

Suzy was working at her desk with a test tube rack and four test tubes. She noted the dark orange precipitate forming in test tube number 3 on her lab sheet. Her teacher shouted at her from across the room.

Mrs. Delores Pequod: Suzy, GOGGLES!

Suzy: But Mrs. Pequod, the goggles have not been sterilized. And why couldn't we go to the Wear Red program?

Pequod: Suzy, Goggles! Wear red. Bah! You have to finish your benchmark and your experiment.

Suzy walked over to the lab counter. The goggles were piled high, some grimy, some with fogged-up lenses. She thought if she got a pair that looked clean, maybe she would not get pink eye or something even worse. Mrs. Pequod comes to her desk holding a test answer sheet.

Pequod: Suzy, You did not answer number 2. You know it is not good to leave blanks. Please answer this question so I can go scan your paper.

Suzy: Mrs. Pequod, I cannot answer this question. The question is bogus, it cannot be answered.

Pequod: Suzy, you must answer the question. I have to verify that all students have answered all the questions. Your growth will determine if I get to keep my job or not.

Suzy: I cannot answer the question. She grabs her head with both hands. I am so confused. We are told it is important to think, and then told just to bubble a stupid answer.

Pequod: What are you writing here? *She points to the lab report.* This is wrong. The formation of the precipitate in your test tube confirms that the solution is positive for iron sulfate.

Suzy: No, the precipitate in my test tube verifies that it is possibly Iron II sulfate. There could be many other possibilities that have yet to be explored.

A student yells from the other side of the room.

Stacey: Mrs. Pequod, HELP! The NaOH pellets stuck to my finger. I can't get them off.

Pequod: Why did you use your fingers? You should have used a scoop. I am busy, rinse them in the sink.

Stacey: I saw Joey get them out with his fingers. I can't get to a sink—the sink is stopped up. The faucet will not turn on. My fingers are burning, Mrs. Pequod. *Stacey holds her middle finger in the air to show Mrs. Pequod; the digit is covered in sticky NaOH pellets.*

Pequod: Suzy, bubble an answer.

Suzy: Don't you need to go help her with her fingers?

Stacey: Mrs. Pequod, please help…this sink could be full of anything!

A student at the same lab table tosses a sodium hydroxide pellet into the dirty water….a flame arises from the water. Suzy bubbles "C," hoping the teacher can now go help her friend.

Pequod: Thank you.

She puts the paper on her desk and calls Stacey to the sink in the prep room. Suzy reaches up and grasps the red Mardi gras beads around her neck.

Suzy*:* Is anyone important anymore? Henrietta, your cells are an amazing part of science…but so are you! How can I get people to see that?

Suzy glances out the window and sees a woman dressed in a brown suit walking away from the school. That looks like Henrietta. No it couldn't be? Or could it? She squints her eyes closed and then opens them again and the woman is gone.

AFTERWORD

Exploring and sharing the story of Henrietta Lacks began with my first reading of *The Immortal Life of Henrietta Lacks*. When I began sharing the story, I was amazed at the conversations the story sparked with my high school biology students. The conversations paved the way for me to connect science to my students who prefer literature, art, and poetry over science. Five years later the conversations are alive and well. Just yesterday, I received an email from a student about our Wear Red to Honor Henrietta Lacks event. She said, "I know its three days away, but I know you're already reading about her! Ha-ha, I miss you, Mrs. McCullough! And hope you have a fantastic Henrietta Lacks day." I was amazed that she took time away from her busy college schedule to send me this email. Henrietta's story does indeed take the reader to a place where they can learn "from the recreated other in the text to see features of a social reality that may have gone previously unnoticed" (Barone 1990, p. 314). Conversations concerning scientific research, medical ethics, segregation, racism, sexism, culture, and history have filled my classroom with each reading. Young people have a lot to say. Students need a place where they can use their voice concerning the world in which they live. Other opportunities can arise from other stories, but at this moment in time, the story of Henrietta Lacks will remain at the forefront of the curriculum in my classroom. As I read and study, I hope to find other stories that we, my students and myself, can explore together.

Resurrection of a Living Curriculum

Curriculum should be "a coursing, as in an electric current. The work of the curriculum theorist should tap this intense current within, that which courses through the inner person, that which electrifies or gives life to a person's energy source" (Doll, 2000, xii). Just as we live with blood coursing through our veins, curriculum is living, breathing, constantly growing, and

evolving. Curriculum should incorporate "all the contours of the *Lebenswelt*, the lived world, everyday life" (Bowers, 1995, p. 11). "Curriculum unfolds into the 'curriculum-as-plan' that we typically known as the mandated school subject, and into curricula-as-live (d)—experiences of teachers and students—a multiplicity of curricula as many as there are teachers and students" (Aoki T. , 2003, p. 2). Where does pedagogy reside? Between the curriculum-as-planned and the live(d) curricula. Aoki calls theses "sites of living pedagogy" (p. 2). The standards on the brick wall in my classroom are in no way living. The standards are a fixed entity in the classroom for teachers and administrators and unfortunately students. If the standards are not taught with elements of lived experience there will be dire consequences. "Erasing lived experience, erasing human subjectivities in school life, endangers students and teachers alike because we will have no sense of who we are" (Morris, 2001, p. 2).

A curriculum should be interdisciplinary, and built from multiple perspectives. A curriculum with potential to resurrect life in science curriculum should incorporate alternative pedagogy that creates a space for curriculum to evolve in spaces where the participants intersect. There must be alternatives for the current one-size-fits-all education implemented by the governing bodies of education. This is not a new dilemma. John Dewey explained during the Progressive education movement over 100 years ago that "The educational experiences must reveal a depth and range of meaning in experiences which otherwise might be mediocre and trivial" (Dewey, 2009, p. 129). Current educational experiences fall very short of the "rich and abundant experience" that education can bring (Grumet 1999, p. 24).

Connections may deal with a student's interest, a student's background in science, or the value of the student's culture that they bring to the classroom. Curriculum must be designed according to the student's interests and the student's academic needs. A standardized curriculum

will never meet the needs of every individual student. As curriculum comes to life, discourse will arise.

Conspiracy Comes in the Form of Discourse

Science is discourse. Scientists participate in constant conversations concerning their work in a formal manner at conferences and through peer-reviewed journals. Science education should involve discourse. Participation in discourse enables students and teachers to find a broader understanding of curriculum not only through discussions concerning science, but by seeing connections to "cultural, historical, political, ecological, aesthetic, theological, and autobiographical" aspects of education (Slattery, 2013, p. 200). Teachers and students must also realize the "impact of the curriculum on the human condition, social structures, and the ecosphere rather than the planning, design, implementation, and evaluation of context-free and value-neutral schooling events and inert information" (Slattery, 2013, p. 200). Meaning will rise from discourse. Education should be a meaningful experience for participants. Students' success should not require them to abandon their defining characteristics: "ethnicity, race, and sex, all of which are stripped away" (Pinar, Reynolds, Slattery, & Taubman, 2008, p. 304). Students' personal stories cannot be discounted. Students must be considered valued stakeholders in the education process. I propose that storytelling in science serve as a springboard to create the needed discourse to make science meaningful to students.

Without stories, curriculum can be characterized as a "linear sequential, easily quantifiable ordering system," combined with expectations of "clear beginnings and definite endings," pre-packaged for teaching complete with guidelines for delivery (Doll, 1993, p. 3). Blades (1997) uses the term "technical-rational approach" to describe this prepackaged phenomenon. The "technical-rational approaches to curriculum change have dominated

educational discourse since the mid-seventies" (p. 84). Nothing about curriculum actually changes, because models created do not actually change. The models focus on techniques of teaching. "Instead of examining the model itself, the failure of curriculum reform has been rationalized during the past decade as a problem of knowledge: change has yet to succeed because the correct techniques have not been fully articulated and then applied" (p. 84). If the model curriculum were delivered in an appropriate manner by all teachers, the model would be successful in promoting change. In essence, if teachers were machines, the proposed models would prove effective. Joel Spring (2013), in his recent satire *Common Core,* tells a story of terrorism in schools. He speaks about how curriculum could become successful by simply changing the delivery method. Fictional educational leaders in his book address the issue by suggesting that replacing teachers with robots would solve the problem of failed curriculum initiatives. Spring (2013) writes: "Teacher robots: Our Hope, Our Future" (p. 48). Teachers often feel that administrators and education initiatives require them to be robotic in order to meet all the evaluation standards.

The vicious cycle of attempts to perfect teaching techniques goes one step further, mandating teachers to use a strictly standardized curriculum. Along with current scripted delivery methods, the predetermined standards lack dimension, as well as meaning, for teachers and students. The potential for improvement would involve finding a "complex, pluralistic, unpredictable system or network" upon which to build a foundation for educational experiences for students and teachers alike (Doll, 1993, p. 3). Marla Morris (2001, p. 103) describes curriculum as a collection of noise in the classroom; not physical noise such as 32 students talking at once or potential disruptions over the classroom intercom but the "process where we feed off one another, we interrupt taken-for-granted knowing's, we generate new orders out of

disorders." This type of living, noisy, curriculum cannot be pre-scripted nor put on a curriculum map.

Henrietta Lacks has provided a lot of noise in my classroom. A space has evolved for a living curriculum full of discourse. It is in this place that we can understand how the history, culture, and philosophy of science and science education intersect with students. Transformation cannot take place without venturing outside boundaries and crossing predetermined borders. Teachers must venture outside these borders and provide an opportunity for students to venture outside the lines of the usual linear standardized education. The black box is sitting there, waiting. A scientific system inside the black box, left for only scientists, must be opened and made available to all participants of science. These participants can gain understanding and social justice by constructing connections in "spaces of transformation" (Serres, 1982, 2007, p. 73).

As we part, I reflect that I began with intentions of writing a narrative that the reader would find inspiring and simple to follow. The intention of this storied work was to complicate the readers' story or stories. As a participant in this conspiracy you had an opportunity to connect to Henrietta Lacks. I wonder: Will your journey continue? Will the connections that you made continue to inform your personal conspiracy to work toward change in education? All participants have an opportunity for continued growth as stories are shared, and woven together as other conspiracies arise to instigate change in education. In the process of writing, as a participant in this conspiracy, my story has been complicated. This is not a journey that must end when the last page is turned. I want to continue to linger.

The idea to "linger" is something that seems more rare to me than when I first read the term described by Aoki (1996, p. 75) and Coles (1997, p. 93). I have discovered that lingering is not a romantic notion such as when we take a breath, or stop to enjoy a brief moment. Lingering is a deliberate act required if one is hoping to find opportunities that lead to change or to new ideas. I find myself reflecting daily upon the privilege I have experienced while lingering with Henrietta Lacks throughout my graduate program and this dissertation process. I want to teach my students how to linger. With curriculum maps and benchmarking deadlines, it is very difficult to create an atmosphere fit for lingering. We have to stop, we have to be interrupted for real lingering to occur. Noise must shatter our original thinking—our thought patterns in order for us to venture into a new space where we can compose new stories. "We bring all our sorted histories, hopes, and desires to the project of curriculum theory, hooking onto familiar stories and creating new ones" (Baszile, 2010, p. 483). My story has been rewritten by knowing the story of Henrietta Lacks. My story has been complicated by the all the authors I have read, real conversations in my graduate classes, real conversations with my high school students, digital conversations, and the conversations that only took place in my imagination. As we read, write, talk, and think, the conversation will continue to be both complicated and rewarding.

By introducing high school biology students to Henrietta Lacks, such a space for creating stories is created. In this space teachers can teach science, and the history of science, and show students the need for social justice to be a part of science. In this space students can see the importance of their participation in science and their participation in bettering society and becoming activists for social justice. With Henrietta, teachers and students become co-conspirators to bring about change not only in classrooms and schools, but in communities, society, and the world.

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