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Denise Pacheco

Veronica Nelly Velez

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Maps, Mapmaking, and Critical Pedagogy: Exploring GIS and Maps as a Teaching Tool for Social Change

Denise Pacheco
University of California, Los Angeles
Graduate School of Education and Information Studies
Veronica Nelly Velez
University of California, Los Angeles
Graduate School of Education and Information Studies

I was nervous standing in front of my family, over one hundred community members, and the Pasadena School Board.[1] I checked and double-checked my computer, power point slides, and notes one last time. The GIS maps I had spent months creating were ready to go—but was I?

I gazed out into the audience at each one of the parents, students, and community members. Their lives and struggles were embedded in these maps that visually portrayed how race has shaped the demographics and opportunities available in Pasadena schools over the last fifty years. Yet, I knew as I looked out at the hopeful faces of my community that this information could not stand alone. Today the burden was on me to give a voice to the maps and to narrate a story of how parents and students experienced racism in Pasadena schools. Not only was I using statistical data to argue that the spaces students occupy in public and private schools within our "City of Roses" are heavily racialized, I was also telling an important counter-story of possibility. It was conveying the complexity of so many people's experiences that made me the most nervous. Who was I to speak for so many?

Slowly I began, explaining map after map. I weaved in the colorful threads of countless voices, both past and present. Glancing back and forth from the computer screen to the crowd, I remembered Alicia's struggle to access Advanced Placement courses in her public school while the private school, less than five minutes from her home, offered over twenty. I caught Julio's eyes and saw him smile shyly at me. I recalled his many years of organizing Pasadena parents to demand that the school board provide much-needed resources for the public schools. I verbally danced between the quantitative data on the screen and the stories of a people, hoping this creative and complex narrative would reach just one more school board member. Numbers, statistics, and stories tumbled out of my mouth as my confidence increased. Census data swirled with stories of segregation, stories of missed opportunity, stories of survival, and triumph.

Before I knew it, the presentation was over. I held my breath for a moment as I waited for the audience to respond. The parents and students quickly burst into an enthusiastic applause, thumbs up, and many wide grins. I exhaled a sigh of relief and began shutting down my computer as one mother walked up to me and said, "Now our story has finally been told." After four years of working with her, this seal of approval meant the most to me.

I. INTRODUCTION

Maps generally function as a tool for visually organizing thoughts, experiences, and ideas. From the conceptual maps used to plan an essay to the geographical maps that orient how societies exist and function in the world, maps are cultural artifacts that document how people engage with one another and their environments. The term "map" comes from a Medieval Latin phrase meaning "sheet of the world." We believe that people engage with the world through the lens of value systems and relationships of power. Likewise, we believe maps reflect and project these engagements. No map can speak for itself and the cartographer's

motivations, often left invisible, are central to the construction, function, and analysis of a map.[2]

We open this paper with a counter-story vignette[3] to convey our experience with the role of maps in our work as educational researchers, activists, and teachers. While the maps referred to in the vignette were constructed primarily through the use of computerized systems known as geographic information systems (GIS), we believe that many of our arguments could be extended to maps in general.

We find GIS, a tool most often used by geographers and urban planners, to be relevant and useful as a methodological and conceptual tool for our work in schools. Initially, GIS was introduced to us as simply a visual display of spatially related demographic and statistical data concerning schools.[4] But as we explored it further, we realized that it had the creative capacity to show qualitative data. GIS can both contextualize statistical data in educational research as well as broaden the sociohistorical and political context of such research. The potential for using GIS in schools led us to wonder if there is, for example, a way to layer students' experiences within low-performing California high schools onto a map of such schools. If a brightly colored "objective" dot on a map truly represents a high school that is over 50 percent Latina/o in the city of Los Angeles, could we make that dot tell a more "subjective" story about its origin and function in students' lives? If the maps we create are meant to help policy makers ameliorate the conditions in U.S. public schools, do we not have an obligation to consider the role of people's lived experiences within those schools?

These kinds of questions were born one night in Pasadena when we used maps as a tool for challenging segregation and racism in public schools. As we considered the role and power of maps in addressing inequality in education, particularly at the "Thirteenth Annual Latina/o Critical Race Theory Conference" in Seattle, we turned to our work as teachers. As pedagogues committed to using educational spaces to foster the development of critical thinking, we believe that maps can be used to assist

students of all ages to better understand the dynamics that shape their communities, cities, and nation. We asked ourselves, how would a map portraying the conditions in U.S. schools be different if it were authored by a student, teacher, or parent? How might its construction allow entire groups of students to better understand the function of high-stakes testing, tracking, and differentiated curricula in their lives, and in the lives of students very different from them? What would it mean for educational policy if maps created by teachers and students were given the same validity and weight as those created by educational researchers? Drawing on the insights of critical theorist and pedagogue Paulo Freire,[5] we argue that teachers ought to consider using GIS and maps in their work toward achieving a larger goal of social change through education.

To achieve our ends, we begin by briefly defining Critical Pedagogy, including its roots and theoretical bases. Here, we explore Freire's problem-posing method as one approach for how to incorporate maps and mapmaking into the critical pedagogue's toolbox.[6] We then explore how maps and mapmaking through GIS technologies have important power-related elements that need to be exposed and addressed in order to re-imagine them as tools of Critical Pedagogy. Next, we illustrate how maps and GIS can become tools of Critical Pedagogy and the broader project of social change because they can show *how* we connect the spatial dimensions of lived experience with curricular content and classroom activities related to maps and mapmaking. Finally, we conclude with a critical call to remedy the digital divide, where many schools serving low-income Communities of Color[7] continue to lack adequate opportunities and technological resources to prepare their students.[8] GIS cannot be a tool for Critical Pedagogy until we have solved the digital divide with a focused effort toward bringing technological support and access to schools; only then can we make GIS as a tool for Critical Pedagogy a reality.

II. CRITICAL PEDAGOGY

Critical Pedagogy is a field of study that looks at the social, political, and cultural context in which classroom learning operates, making an important connection between the teaching and learning that happens in the classroom and the dynamics of power and socialization that operate on a societal level. Viewing schools as one of many social institutions characterized by race, gender, and class hierarchies, critical pedagogues encourage educational practitioners to consider how the traditional curricula and pedagogies serve to sustain these hierarchies.

A. Roots of Critical Pedagogy

The central components of critical theory, as defined by the Frankfurt School, offer a theoretical foundation that illuminates the central goals and tenets of Critical Pedagogy. Henry Giroux defines critical theory as both a school of thought and a process of critique characterized by self-reflection in order to avoid "[clinging] dogmatically to its own doctrinal assumptions."[9] This notion of self-conscious critique is essential because it suggests that, as critical theorists and educators, we must constantly examine the effects of our own pedagogy and the ideological assumptions embedded in our own practice as we lead students in developing the skills we deem most significant. In this way, teachers and theorists alike are challenged to avoid creating strict definitions or a "canon" of critical theory and, by extension, Critical Pedagogy. Instead, we are called to continuously push the boundaries of what is considered "critical" and search for new contexts or experiences that are not currently addressed by critical theory.[10] The Frankfurt School urges us to constantly increase the scope and applicability of critical theory, arguing that critical thinking as a *practice,* rather than the articulation of specific ideas, is a "constitutive feature of the struggle for self-emancipation and social change."[11]

The Frankfurt School and its theoretical descendants in critical theory believe that the critical aspect of theory should emerge in its unmasking

function.[12] This unmasking occurs in part through dialectical reasoning, which serves to uncover the imperfections and incompleteness of systems of thought. In response to the notion that "we have arrived at the truth," the dialectical process exposes the role of value-laden ideological frames that shape the existence and function of a theory, revealing it to be one interpretation rather than a universal, infallible concept. Dialectical thought also traces the social and political "inner history" of a theory, highlighting these hidden assumptions to reveal the theory's existing limitations. In sum, dialectical thought "reveals the power of human activity and human knowledge as both a product of and force in the shaping of reality"—highlighting the direct link between knowledge, power, and domination.[13]

For the Frankfurt School, critical theory is a necessary precondition for human freedom, shaping theory into a political endeavor. Analysis in this sense ought to be used not as a means to a preconceived end, but a means for challenging our preconceived notions of what our ends should be and how we arrive at them. Thought becomes an act of liberation for the individual and the community. Freedom is achieved through a constant struggle to complicate how human experiences are framed, analyzed, and understood as a reflection of the power relationships that characterize much of society.

The Frankfurt School provides a theoretical direction for how students should be led in their investigation of society and the relationships of power that govern society in a particular spatial context (i.e., school, neighborhood, and city). For the Frankfurt School, the "fetishism of facts and the belief in value neutrality" associated with positivism represents more than an epistemological error; more importantly, such a stance serves as a form of ideological hegemony making positivism a tool of political conservatism, validating the status quo.[14] In this paper, we argue that the problem-posing method associated with critical educator Paulo Freire is one practical application of the theoretical insights offered by the Frankfurt School. As students in urban communities learn to analyze their everyday

interactions with peers, teachers, community, and family members, and connect those experiences to larger social dynamics of privilege and oppression, they begin to challenge the dominant narrative of their communities as represented in mainstream media. Later in this paper we provide one example of how students can begin to document the diversity of an urban community through GIS, identifying and mapping places that are resources for their personal development as young people (i.e., community centers, parks, and places of historical significance). Scholars within Critical Pedagogy channel the Frankfurt School's investigation of society by focusing on how the dynamics of power and socialization operate through the institution of schools on a national level, and also how these forces play out in individual classrooms.

B. The Theoretical Bases of Critical Pedagogy

Critical Pedagogy applies critical theory to the classroom as part of its pursuit of pedagogical approaches that will enable non-dominant[15] students to develop the skills, knowledge, and modes of inquiry that will "allow them to critically examine the role that society has played in their own self-formation" and understand the degree to which society has "prevented them from even imagining a life outside of the one they presently lead."[16] This is a crucial step in shaping the intellectual and cultural tools students require to lead independent lives.

Peter McLaren offers a useful overview of many of the central aims and characteristics of Critical Pedagogy.[17] He argues that critical educational theorists essentially work to debunk the traditional view of schooling as a neutral, democratic process existing apart from the larger cultural, political, and economic contexts in which schools operate. Instead critical pedagogues argue that schools work to sort students on the basis of race, class, and gender in a manner that rationalizes and resonates with society's social and economic hierarchies. Critical Pedagogy analyzes and deconstructs the myth of meritocracy arguing that "successful learners are

those whom schools reward."[18] In the United States, considering graduation rates and performance averages on math and reading assessments, these most "successful" students are typically white and middle class.[19] In addition, mainstream explanations for the underachievement of Latina/o and African American students have historically taken a deficit approach.[20] Deficit thinking, or the blaming of a student's lack of academic achievement on alleged deficiencies associated with the student, such as cognitive ability or family structure, has played a central role in the dominant discourse around school failure.[21] Historical and current manifestations of deficit thinking often undergird institutional practices of exclusion and segregation that limit the access working-class students and Students of Color have to educational equity.[22] Exploring these roots reveals the degree to which educational inequity is a structural, rather than an individual condition. Michel Foucault argues that, in this context of structural inequity, socially valued knowledge production is often limited to an elite group of men.[23] In such a context of structural exclusion, the belief that Students of Color are holders and creators of knowledge is highly significant for challenging exclusionary practices and the dominant ideologies that support them.[24] This critical assumption—that Students of Color ought to have opportunities in their schooling experiences to express and develop the knowledge they carry—is foundational to this paper.

The work of Brazilian critical educator Paulo Freire is regularly cited as an important link between the analysis of critical theory and the development of pedagogical strategies that address the societal power dynamics that manifest in schooling.[25] Freire argues for the use of the problem-posing method of teaching in response to what he calls the "banking" approach to teaching.[26] He defines the banking approach as one in which people are objects that exist *in* the world versus *with* the world or with others.[27] It positions the teacher as the narrator of information that is deposited into students whose function is to be receptacles of this knowledge. In this exchange, the teacher offers a reality that is disconnected

from the larger context; the teacher's information is "motionless, static, compartmentalized, and predictable."[28] In this pedagogical model, students' primary goal is to passively memorize the information presented by the teacher. In the banking approach, students are considered to know nothing, negating "education and knowledge as processes of inquiry."[29] Rather than exploring, for example, why Washington, D.C., is the capital of the United States, what warrants a city becoming a "capital," and whether or not the benefits of living in the capital extend to everyone, etc., the banking approach demands that students simply memorize the capital and accept this fact. Traditional approaches to education have historically argued that this model is the most efficient and reasonable—not all students are "suited" or willing to engage in higher-level thinking and analysis.[30] Working from a different premise, Freire argues that knowledge is not this static. Rather, it is invented and reinvented through the process of collaborative inquiry and engagement with the world. To strip education of the process of inquiry is dehumanizing to both teacher and student[31]—crippling the vocation of becoming more fully human by "indoctrinating them to adapt to the world of oppression"[32]—rather than using their creative power to eliminate oppression and transform society.

C. The Problem-Posing Method

In response to the problems that the banking approach creates for learning, Freire proposes education as a practice of freedom and the problem-posing method as a central aspect of the development of critical consciousness. In this structure of education "people develop their power to perceive critically *the way they exist* in the world *with which* and *in which* they find themselves; they come to see the world not as a static reality, but as a reality in process, in transformation."[33]

Where the banking approach inhibits creativity and domesticates students to act as passive receivers of information, the problem-posing method engages students and teachers in the process of reflection and action, or

praxis. This teaching approach focuses on unveiling reality, rather than hiding it. Students and teachers collectively examine, through inquiry and dialogue, problems related to their positions in the world and engage in generating critical interventions to these problems. Where the banking approach has students and teachers submerge their consciousness and accept a passive existence as objects of reality, the purpose of the problem-posing method is to develop a critical consciousness of the world.

Freire also argues that there is a reciprocal relationship between reflection and action. Teachers and students adjust the choices they make and the roles they play in their communities when they begin to ask questions about their experiences in the world. With the problem-posing method, action and reflection are not dichotomized. The actions we take—the ways we interact with one another at work, home, and in the community—are intimately tied to the perceptions we hold of ourselves and others, and the roles we play in each of these areas.[34] For example, when students analyze a concept like "gender," they simultaneously exercise action and reflection. As students begin to reflect on gendered behaviors that are often taken for granted as the "natural ways that boys and girls act," they begin to understand themselves differently, as well as the ways in which they interact with one another. This has the potential to influence their everyday choices, and more broadly, to lead them in changing aspects of gender roles in their daily lives. The process of inquiry associated with this method is most concerned with fostering an awareness of human beings as incomplete, constantly moving forward to better understand and manifest their humanity. Given Freire's insights, it is possible to define the problem-posing method as a cyclical process with identifiable stages of inquiry. While each step has a particular goal or practice associated with it, it is expected that students and teachers may engage in multiple aspects of the process in a single conversation, and that participants may not follow a particular order.

1. Assessment of Reality

Students and teachers begin by assessing reality. This often involves a process of assessing who they are relative to a broader context that is significant to them. This could be the students' neighborhood or their ethnic or racial communities; space (both material and abstract) becomes an important part of how students and teachers assess their realities. Where we live is often an integral part of who we are, shaping our everyday lives in significant ways. The teacher may pose questions such as: What do they see? What do they feel? What do they experience? How would they define the world they live in?

2. Identification of Generative Themes

Next, through conversations, presentations, and engagement with materials that help students define their realities, students and teachers arrive at generative themes, that is, concepts that begin to define or describe their experiences, such as "racism" or "sexism." Teachers help students to identify these themes as they instruct and lead students in examining their lives. As students discuss their experiences in the world, teachers note topics or practices that are often mentioned by students. Or, they might observe and highlight the most widely or intensely discussed topics or practices. Here is where the concept of space can be useful. For example, what kinds of common elements do students see in their relationships with others in their neighborhoods, communities, or world? Do these elements exist across different contexts such as school, home, and in places of business?

3. Identification of Codes

Next, students and teachers discuss possible problems that exist in relation to the generative themes they defined, and they identify an appropriate code, such as an image or a phrase, that best captures the theme being discussed. A code within the problem-posing method is best defined

as a visual artifact that represents the generative theme. For example, as students begin to define their reality, many notice that there are categories of "male" and "female." A student may bring in a picture, quotation, or story that describes how men and women embody different roles and how these roles seem to emerge in different settings. The codes that arise might be the kinds of roles and behaviors that are associated with men and women (i.e., men tend to be aggressive and have the power to hit women while women are comparatively more passive and quiet in relation to men). Yet, as conversation and research into naming and understanding the various practices of gender develop, students might begin to complicate these ideas, noting that women can also exercise power over others, namely children. Similar to what is noticed with men, a student might argue that women can also embody violence, especially in relation to those who have less power. It is important that as codes are defined, students begin to identify practices with which they agree and disagree. They investigate why certain practices are valued over others, and how these practices reflect different aspects of their world. Part of this process requires discussion of the theme and code, as well as reflection relative to a larger context, helping students and teachers to place their beliefs, roles, and actions in relation to others both locally and in the world. A common experience between one or more students might not be the same for another group of students. How do students make sense of this complexity? If not everyone has experienced domestic violence, what does this say about the nature of gender? Reflecting on similarities and differences between what students notice lays the foundation for a discussion of the origins of common social problems.

4. Problem-Posing Dialogue

Using insight gained from the themes and codes, students and teachers consider how the problems associated with the codes came to be. Students and teachers may pose questions such as: What kinds of practices or understandings of the world support or even naturalize a situation where

men and women are violent to one another and to their children? In what ways does it manifest in our homes or communities? When did this situation begin? How has this situation changed over time? How can we understand the lifecycle of this problem?

5. Identifying Solutions

Next, students and teachers consider the kinds of practices and structures that are required for the situation to change. What would have to change in order for men and women to relate to one another and to the world differently? What resources are required to bring about these changes? How might we begin to act in different ways to support and sustain this change? Here, students and teachers discuss the possible ways to solve the problems they identified in the previous step.

6. Reassessment of Reality

In this step, students and teachers reconsider and reevaluate their reality. As they go through various themes multiple times using the problem-posing method, we expect both students and teachers to assess and reassess the knowledge they share about their existence in the world. Freire argues that, over time, people will begin to consider phenomena that they previously took for granted as "natural" and consider the implications of these practices. The previous "objective" becomes problematic and assumes the character of a challenge to be addressed. Ultimately, the goal is to gain a deeper understanding of the world as dynamic as opposed to static; a historical reality that is susceptible to transformation, as opposed to a fixed fatalistic absolute. Students and teachers alike begin to consider what *can* be, what *should* be, and what we *want* to be, as opposed to what is, what must be, and what always will be.

D. Reflecting on the Problem-Posing Method

As we describe the problem-posing method and this process of critical inquiry, it is important to note that this is not a linear process. For example, teachers do not have to wait to identify a code before they can engage in a problem-posing dialogue with students. In reality, one conversation with a small group of students can focus on just one aspect of the process, or it can cover multiple stages. In addition, our experience shows that students move through the process of problem-posing over extended periods of time. One moment of realization is tied to countless moments of reading, studying, thinking, and discussing, which came before. Furthermore, it is imperative that teachers and students exercise patience, respect, and flexibility as they learn to examine, challenge, and reform the assumptions that govern their approaches to difficult topics such as race, class, and gender.

It is not the central goal of the problem-posing method for students to move through each step of the problem-posing process in a neat, organized manner. Rather, individuals come to understand their world as they learn to study the world, reflect, and listen to one another. It is common for students to also embody different degrees of understanding in the same moment or discussion. In the same lesson, one student may be defining his reality while another is assessing the problems that her reality demonstrates. This diversity and fluidity is vital to a successful dialogue that, over time, leads students to practice a more critical analysis of the world in which they live.

Perhaps more important than the problem-posing approach itself is how teachers and students work together to foster a context in which the kinds of critical thinking, deep reflection, and study associated with this method can flourish. Building on the work of Freire, Lilia Bartolomé argues against a "methods fetish," or the "over reliance" on instructional strategies and the blind replication of particular programs as the solution to the academic underachievement of non-dominant groups.[35] A focus on mechanical formulas ignores the larger reality in which students are struggling to learn and blurs the real question, which for Bartolomé is, what does the larger

socio-historical context of present conditions tell us about why subordinated students generally do not succeed academically in schools? Bartolomé argues that "creating pedagogical spaces that enable students to move from *object to subject position* produces more far-reaching, positive effects than the implementation of a particular teaching methodology, regardless of how technically advanced and promising it may be."[36] Bartolomé is essentially arguing for a shift in intention. Focusing on developing a robust pedagogical space is superior to following a predetermined set of steps because teaching and learning are inherently dynamic and constantly changing depending on the context and the participants. Becoming overly attached to a particular methodology stifles a teacher's ability to closely study students' development over time and modify curriculum and instruction in response to what the students need—both at a given moment and over the course of a school year. If the goal is to successfully implement a particular methodology, the focus becomes the methodology itself—not the students and their learning. Bartolomé's warning echoes the values of the Frankfurt School—in response to an ever-changing context, we must constantly reflect and revise our practice.

For Freire and Bartolomé, there is no singular method for generating the type of dialogue and analysis that will improve learning for all students and reverse the oppressive conditions that have created educational inequities. Rather, their arguments suggest that it is the informed[37] way in which a teacher implements a method that offsets discriminatory practices and improves the quality of education.[38] It is our job as educational practitioners and researchers to offer a wealth of examples and rich descriptions of particular settings, encounters, and approaches that have brought about desirable changes in learning environments. Our aim in this paper is to offer GIS as a tool for examining and building contexts that maximize students' ability to analytically observe, consider, and respond to the world in which they live. We hope that as teachers and students begin to take up the tools of GIS, their understanding of space and their relationship to the spaces they

occupy, such as the school, home, neighborhood, and city, will begin to transform in ways that support the fundamental restructuring of those spaces.

Before we examine GIS, and how GIS can be a vehicle for the problem-posing method, we must first explore the underlying power of maps.

III. MAPS AND GIS

A. Maps: Unmasking Intentions

Maps are visual artifacts of how people see the world as mediated by their particular value systems and relationships of power.[39] For example, maps were used during the era of European colonization to trace their conquest of the modern world. Maps facilitated official communication between colonial rulers, documenting which lands belonged to particular nations and where these empires sought to expand. These maps served particular military, economic, and political ends that often did not acknowledge the prior existence of sophisticated civilizations, let alone their perspectives and experiences with European nations. These maps, in a sense, erased not only the validity of indigenous peoples' claims to the lands where they had lived for centuries, but also their very existence. Linda Tuhuiwai Smith argues that Western maps reflect a Western conceptualization of space.[40]

Smith describes how in the nineteenth century, maps were used to define territories, survey land, and mark the boundaries of colonial power. The center was typically the "mother country" because the center oriented the viewer to what was most significant. Outside of the center was typically empty space. Smith argues that the "outside" is important because "it positioned territory and people in an oppositional relation to the colonial centre."[41] For indigenous peoples, an existence outside and apart from the colonial power, in empty space, meant nonexistence. Over time, maps became artifacts, tools reflecting a particular worldview—only specific

European nations were "civilized" enough to maintain control over vast areas of land and their natural resources. The artifact functioned as one piece in a complex puzzle that encouraged and supported the conquest of indigenous land throughout the world. In short, we are often taught to use maps as if they are complete, true representations of the world; in fact, they are interpretations based not just on what people see and experience, but what they believe about these experiences.

When examined this way, maps are inextricably tied to their makers, who become a necessary and critical component of understanding what a map represents and how exactly it is supposed to function.[42] In addition, it reveals that maps are not the static, one-dimensional objects we have been trained to see them as, but rather are active artifacts, representing and constructing knowledge as individuals engage with them.[43] According to Jeremy Crampton and John Krygier, geographers who have significantly contributed to the field of critical cartography, "maps are active . . . they exercise power . . . maps sweat, they strain, they apply themselves. The ends achieved with so much effort? The ceaseless reproduction of the culture that brings them into being."[44] As Crampton and Krygier point out, the inherent power of maps lies in their ability to not just represent society, but also their ability to reproduce it.

In the following section we explore this issue of the inherent power of maps by analyzing how one approach to Crampton and Krygier's construction—geographic information systems (GIS)—has the potential to help reproduce or transform oppressive conditions in society. By recognizing its transformative possibilities as well as its dangers, all members of the community and school can work to employ GIS and maps generally, as critical teaching tools to create social change.

B. GIS: Purpose, Critiques, and Potential

In the last thirty years, the construction of maps has been greatly facilitated by the use of computerized technologies known as geographic

information systems (GIS). GIS software constructs maps through layers of information, thereby helping to reveal spatial relationships among different data sets. According to geographers Sarah Elwood and Helga Leitner, "GIS is a computer technology that enables storage, analysis, and mapping of a wide range of geographic information, including demographic, socio-economic, housing, crime, environmental, and land-use data."[45] For example, you may want a map showing the concentration of high schools offering advanced placement classes in high poverty areas within San Diego County. With GIS, you can easily attach data about school characteristics, including what types of classes they offer, to the physical locations of schools in San Diego County. This would create a "map layer." You can then download census data that shows poverty by census tract and create another map layer that shows the density of poverty across San Diego County. When these two layers are combined in GIS, you are not only able to show the concentration of high schools offering advanced placement classes in high-poverty San Diego communities, but you are also able to perform a variety of spatial analyses using tools provided in GIS. Using these statistical and analytical tools, you may be able to determine, for example, where additional high schools offering advanced-placement classes need to be built in order to provide this type of educational opportunity to the greatest number of youths in a high poverty area.

This capacity to analyze and display a large variety of data has made GIS useful for several institutions: from the military to community organizations, city planning departments, and even the health industry—GIS benefits both academics and non-academics alike. Much of the reason its use is so broad is because GIS is able to make complex data accessible to multiple audiences. This is why GIS is used by non-governmental, grassroots, and community groups. They find that technology enables them to design their own maps with alternative knowledge that is often missing in more dominant representations of space.[46] In fact, the growth of GIS use in these spaces has prompted a new field of inquiry, known as public

participation geographic information science (PPGIS), which explores the power of GIS, both its empowering and marginalizing effects, for use by "nontraditional" users.[47]

Although GIS has made its way into many fields and disciplines, its use in education is still quite limited. We argue that GIS can support educational researchers interested in issues related to space and can provide a user-friendly alternative to display complex data or statistical analyses. Yet, in order to convert GIS into a viable methodological and pedagogical approach for critical educators and researchers, it is important to first understand and address its shortcomings.

Despite the many uses of GIS, it has been heavily critiqued by critical geographers and cartographers. One of its critics, geographer Mei-Po Kwan, summarizes these critiques by stating that GIS has been challenged "for its inadequate representation of space and subjectivity, its positivist epistemology, its instrumental rationality, its technique-driven and data-led methods, and its role as surveillance . . . technology deployed by the state."[48] LaDona Knigge and Meghan Cope add that social theorists are concerned with how GIS is "used in ways that rigidify power structures while simultaneously *masking*—through the legitimizing strength of 'science' and gee-whiz displays—the possibility of multiple versions of reality or 'truth,' socially constructed knowledge, and other sources of subjectivity that are inherent in all social research."[49] Most of these critiques are based on the often exclusive association between GIS and quantitative spatial analysis, the politics of representation inherent in maps, and the concern that stems from the use of early maps whose generalizations of the world were used for imperialist and colonial efforts.[50]

Using these critiques as a basis for their own work, many critical geographers are beginning to re-imagine and employ innovative techniques that can further GIS as a critical practice.[51] Their work is opening an emerging field know as "critical GIS."[52] Citing the practices of critical, feminist, and postcolonial cartographers, Kwan argues that GIS can be

renegotiated as a discursive tactic to create "counter-maps," or what Crampton and Krygier refer to as "subversive cartographies," which challenge dominant representations of the world.[53] Kwan refuses to accept the "technological determinism" of associating GIS with a particular positivist epistemology, asserting that the very subjectivities and agency of GIS users can help illuminate the meaningful aspects of everyday life.[54] She engages GIS technologies to analyze both quantitative and qualitative data to create "cartographic narratives"[55] that establish connections between large-scale phenomena and the everyday lives of people, particularly women.[56] Kwan challenges GIS users to both complement their quantitative data with contextual information and use primary sources from individuals in order to complement secondary sources that can often over-generalize communities, as seen with the use of census data.[57]

Kwan acknowledges the positionality of the GIS mapmaker in constructing knowledge and recognizes that the GIS mapmaking process is created from a particular political, social, cultural, and historical subjectivity. Kwan also suggests that GIS users need to reflect on what they want to produce through maps, the actual image of the map, and the audience to whom they hope to convey their representations as a way of thinking ahead about how their maps may be contested and renegotiated by different people.[58] This suggests that critical work using GIS should not rest on simply interpreting maps for counter-hegemonic ends, but should also be deeply attentive to the actual process, or methodology, of creating them.

Building from the work of critical geographers, researchers within Critical Race Studies in Education are building a foundation for the potential use of GIS within a critical race methodology.[59] Scholars exploring this connection are discussing the potential use of GIS in educational research on space, particularly with regards to the investigation of the spatial dimensions of race, racism, and its intersections with other forms of oppression in their relationships to schools and society at-large.[60] To begin addressing this question, we have embedded GIS within a critical

race framework. This collective work has resulted in the following working definition of "critical race spatial analysis" [61] in education:

> Critical race spatial analysis (CRSA) is an explanatory framework and methodological approach using GIS that accounts for the role of race and racism in examining geographic and social spaces, and that works toward identifying and challenging racism within these spaces as part of a larger goal of identifying and challenging all forms of subordination. CRSA goes beyond description to spatially examine how structural and institutional factors influence and shape racial dynamics and the power associated with those dynamics over time. Within educational research, CRSA is particularly interested in how structural and institutional factors divide, constrict, and construct space to impact the educational experiences and opportunities available to students based on race.

Although still developing, CRSA provides one recent example of how scholars are engaging both maps and mapmaking from a critical standpoint.

Given these critiques and emerging approaches that re-imagine GIS technologies for transformative ends in research, how can we use GIS in critical teaching about space? How can teachers use the map and GIS technologies to explore the spatial dimensions of the everyday experiences of their students? In what ways can GIS be used by youths to define the "culturally-wealthy"[62] spaces in their neighborhoods? GIS holds tremendous potential for use in the classroom and in the community as a teaching tool for social change.

IV. THE MAP AND GIS AS A TOOL OF CRITICAL PEDAGOGY

Experience has shaped our philosophy of education and informed us on our proposed use of maps with students and community members. We believe the process of learning is central to human development and social change.[63] In order to adequately respond to social inequity, we must first understand how society functions and begin to envision the society we desire. This world will not emerge solely through a critique of our current

conditions. Instead, we must couple our analysis with active participation in the creation of communities that can wrestle with what it means to actually enact democracy and fairness. The classroom is one place where it is possible to engage in theorizing, practicing, and imagining a better society as one crucial step toward actualizing that society. While critical theory (including Critical Pedagogy) informs the content and form of our proposed pedagogy, simply including theoretical material rooted in this tradition does not inherently make learning a transformative experience. Rather, these theoretical approaches are useful to the extent that they become a tool for restructuring classroom interactions, which allow for questions, dissension, and doubt to be expressed and addressed.

Using a critical pedagogical approach to engage GIS and mapmaking in our work requires a mindfulness as to how such a technology can help students theorize from multiple perspectives about the role that space and spatial relationships play in their immediate lives, local communities, and beyond. Merging GIS and Critical Pedagogy also requires that we ask how teachers and students can engage questions of space and power as part of a larger process of making sense of the world from their local standpoints.

It is our hope that GIS becomes one of many interlocking tools that enables students to better understand and define their neighborhoods and cities. This understanding, while important, would only be one step toward the greater goal of stimulating social change in non-dominant communities. To better illustrate how GIS can morph from a mapmaking technology into a tool for critical educators to engage students in critical thinking, we offer the following example of an after-school program that uses GIS technologies to help students name, define, and understand what is important to them in their community. Working from a Freirean approach, the teachers emphasized the value of the students' perspectives and encouraged young students to consider what they learn from their daily experiences in their neighborhood.

V. PROBLEM POSING USING MAPS: THE CASE OF ALIANZA STUDENTS[64]

In this section, we consider how maps and GIS might be a part of a series of classroom lessons on students' neighborhoods and surrounding communities. We focus on the efforts of the Alianza after-school program for children from kindergarten to third grade. The Alianza after-school program is a Los Angeles-based program that centers its pedagogy on a Freirean approach to education. In the development of its curriculum on social and environmental justice, Alianza felt that including maps and mapmaking could be useful, particularly with regard to helping students reflect and respond to different dynamics in their lives—both in and out of school.

It is common for students to study maps as a part of elementary education. Maps might be a part of geography and history lessons showing students where particular cities and landmasses exist in the world. Maps might also be a part of mathematics, portraying concepts of scale, model, and diagram. In any subject area, we argue that maps can also be utilized to develop students' critical engagement with the world. As an example, we consider a classroom in which elementary students are asked to draw a map of their community as they consider how maps assist people in navigating through the world.

As a first step, Alianza students observe different maps showing the physical layout and major points of interest in their community. Students might consider who designed the maps and their intended audience. For example, a map developed for tourists will include different information than a map designed to familiarize residents with the streets and freeways of the city. Both of these maps might be radically different than a set of maps showing high school graduation rates in their city. Students discuss some of these differences, analyzing examples of prepared maps appropriate for their ages. The first step toward engaging Alianza students in a process of assessing their spatial realities and constructing their own maps to reflect

this reality, is raising their understanding of how maps work and how people use different types of maps in their everyday lives.

In a second lesson, students might use their analytical skills to begin thinking about what is included or excluded from the maps. In a map designed for city residents, what are the "important" sites that are listed? Are there sites that are important to many local residents that are not included? Why might this be the case? Students are encouraged to relate their answers to an initial conceptualization of individual maps of their community. If they created maps of their community, what would they highlight? What would they include, and what would be left out? How does the information in the official maps match or differ from their personal understanding of their community? What do certain official maps leave out, or in their opinion, distort? Why might this be the case? As students discuss these issues, their teacher encourages them to begin thinking about their experiences in the community. What kinds of maps would be useful for them? What would be useful for their family members? Would they like a map of after-school programs or skateboarding parks? What kinds of maps would their family members need? How might a map designed to meet their needs change how they engage with or perceive the community? What would the students be required to do in order to create this map? Throughout this process, both teachers and students at Alianza identify themes and codes that connect and reflect what is being shared—all the while engaging in problem-posing dialogue.

Next, Alianza students might begin practicing the skills of mapmaking by sketching maps of their community that portray different variables or types of information. This is first accomplished by hand. Students draw one map of their community as it currently exists and one version of their community as they would like it to be. They highlight the spaces that are important to them, or are vital to their physical, spiritual, and emotional survival. Students are also asked to bring in photos or videos, if available, of these places that are special to them. With the assistance of staff and teachers,

students then bring their drawings to a GIS workstation where students use a pre-existing GIS map and layer their photos, videos, and audio recordings over the GIS map to humanize and personalize the information on the maps. In one map of the community as it ought to be, a student included a picture of a library, moving it from its current location across town to an empty lot within walking distance of his home. This process of identifying what is important to students and what is necessary for their healthy development leads them to consider why certain resources are available to them and why others are not. If we extend this process to older students, we can imagine how a map showing low high school graduation rates might be complicated by the inclusion of university partnership programs at these local high schools and videos of high school seniors fund raising for college trips. In each case, the end product is the same—both the maps and mapmaking process are a reflection of the students' observations and reflections. The picture will be layered and complex, rather than one-dimensional. While a map solely showing low graduation rates in one area of a city can encourage a negative perception that students in this area do not value higher education, these maps, with the additional data layers, will convey a more complex reality. Right next to raw numbers will be images that reflect what the students themselves define as necessary to increase access to college. Furthermore, they will present a picture of real people struggling to make college a reality, grounding statistical information in individual experiences.

Finally, as Alianza students share their maps with one another and analyze them, they will notice gaps between what their community is now and what they would like their community to be. They begin a new, related process of reflection and dialogue about what could be done to bring about the change that is needed. The teacher may pose questions such as: What are some community strengths that the students would like to enhance? What would they add to their community? What might they remove? And most importantly, why would they make these changes? These maps could

then be collected into a class book of maps and presented to parents, administrators, and community members.

The specific steps or lessons that students engage in is not as important as the nature of the process and what students are encouraged to consider. Critical educators must maintain a focus on the students' experiences in the process of mapmaking as opposed to adhering to a specific diagram.

As artifacts of a cartographer's understanding of the world, maps are dynamic; they change as the author's position in the world changes and as the map itself is interpreted in new ways. Ultimately, as a tool rarely given much attention in educational settings, we believe that maps can be used to assist students, as it did in the case of Alianza, in seeing their environment through a new set of lenses. This is the basic premise of the problem-posing method that is crucial to developing a critical consciousness of the world.

VI. CONCLUSION

Although we provided an approach for how the map, and particularly GIS, can be employed as a tool of Critical Pedagogy, the opportunity to use it will be denied so long as there remains a lack of access in most public schools and communities to GIS or other mapmaking technologies. While the inaccessibility of these tools is true for many public schools, this is especially true for schools in low-income Communities of Color.[65] The result of this digital divide is that Students of Color—particularly poor Students of Color—will be denied the opportunity to become sufficiently literate in these new technologies in order to compete in an ever-growing and rapidly advancing high-tech society. In addition, tools like GIS can be especially useful for members of the school community and community at-large in order to examine, address, and transform their challenges both locally and at-large. While technologies like GIS are useful tools, more work stands to be done to make these tools accessible to the critical pedagogue and the schools and communities he or she serves.

[1] This excerpt reflects a personal experience one of the authors had in February 2007. It documents an event based only on her recollections and reflections.

[2] *See generally* LaDona Knigge & Meghan Cope, *Grounded Visualization: Integrating the Analysis of Qualitative and Quantitative Data Through Grounded Theory and Visualization*, 38 ENV'T AND PLANNING 2022 (2006).

[3] *See generally* Daniel Solórzano & Tara Yosso, *Critical Race Methodology: Counter-Storytelling as an Analytical Framework for Education Research,* 8 QUALITATIVE INQUIRY 23 (2002) (Drawing on the work of Solórzano and Yosso to define counter-story. They define a counter-story as "a method of telling the stories of those people whose experiences are not often told (i.e., those on the margins of society). The counter-story is also a tool for exposing, analyzing, and challenging the majoritarian stories of racial privilege. Counter-stories can shatter complacency, challenge the dominant discourse on race, and further the struggle for racial reform.").

[4] *See* JOHN CAUGHEY, SEGREGATION BLIGHTS OUR SCHOOLS (1967); WILSON RILES, RACIAL AND ETHNIC SURVEY OF CALIFORNIA PUBLIC SCHOOLS 5–14 (California Office of Compensatory Education, Bureau of Intergroup Relations, ed., 1966); EILEEN HORNG, MICHELLE RENEE, DAVID SILVER & JOANNA GOODE, INST. FOR DEMOCRACY, EDUC., AND ACCESS, UCLA, REPORT ON THE EDUCATION GAP IN LOS ANGELES COUNTY (2004), http://www.idea.gseis.ucla.edu/publications/edgap/AD/EdGap-AssemD39.pdf.

[5] *See generally* PAULO FREIRE, PEDAGOGY OF THE OPPRESSED (1970).

[6] *See id.*

[7] "Communities of Color" is intentionally capitalized to reject the standard grammatical norm. Capitalization is used as a means to empower this group and represents a grammatical move toward social and racial justice. This rule will also apply to "Students of Color" used throughout this paper.

[8] *See* Howard Besser, *The Next Digital Divides*, TEACHING TO CHANGE LA: THE DIGITAL DIVIDE (2001), http://www.tcla.gseis.ucla.edu/divide/politics/besser.html.

[9] Henry A. Giroux, *Critical Theory and Educational Practice, in* THE CRITICAL PEDAGOGY READER 27 (Antonia Darder, Marta Baltodano & Rodolfo Torres eds., 2003).

[10] *See* Carlos Tejeda, Manuel Espinoza & Kris Gutierrez, *Towards a Decolonizing Pedagogy: Social Justice Reconsidered, in* PEDAGOGIES OF DIFFERENCE: RETHINKING EDUCATION FOR SOCIAL JUSTICE 10 (Peter Pericles Trifonas ed. 2003); Carlos Tejeda, *Dancing with the Dilemmas of a Decolonizing Pedagogy*, 102 THE RADICAL HIST. REV. 27 (2008).

[11] Tejada, *supra* note 10, at 28.

[12] *See id.*

[13] *Id.* at 36.

[14] *Id.* at 35.

[15] *See generally* Kris Gutierrez, *White Innocence: A Framework and Methodology for Rethinking Educational Discourse and Inquiry*, 12 INT'L J. OF LEARNING 223 (2006) (Drawing on the work of Gutierrez, we use "non-dominant" to emphasize the historical conditions and institutional power relations that shape the experiences of many youths coming from working-class, immigrant, and racial-minority backgrounds).

[16] Giroux, *supra* note 9, at 52.

[17] *See* PETER MCLAREN, LIFE IN SCHOOLS: AN INTRODUCTION TO CRITICAL PEDAGOGY IN THE FOUNDATIONS OF EDUCATION (4th ed. 2003).

[18] *Id.* at 189.

[19] *See* LINDSAY PÉREZ-HUBER, OFELIA HUIDOR, MARIA MALAGON, GLORIA SANCHEZ, & DANIEL SOLÓRZANO, UCLA, CHICANO STUDIES RESEARCH CENTER, FALLING THROUGH THE CRACKS: CRITICAL TRANSITIONS IN THE LATINA/O EDUCATIONAL PIPELINE (2006); U.S. Dept. of Educ., Inst. of Educ. Statistics, Nat'l Educational Progress (NAEP) (2007).

[20] *See* DANIEL MOYNIHAN, OFFICE OF PLANNING AND RESEARCH, UNITED STATES DEPARTMENT OF LABOR, THE NEGRO FAMILY: THE CASE FOR NATIONAL ACTION (March 1965), *available at* http://www.dol.gov/oasam/programs/history/webid-meynihan.htm; RICHARD VALENCIA, CHICANO SCHOOL FAILURE AND SUCCESS: PAST, PRESENT, AND FUTURE (Routledge Falmer, 2002) (1991).

[21] *See* RICHARD VALENCIA, CHICANO SCHOOL FAILURE AND SUCCESS: PAST, PRESENT, AND FUTURE (Routledge Falmer, 2002) (1991).

[22] *See* JOEL SPRING, DECULTURALIZATION AND THE STRUGGLE FOR EQUALITY: A BRIEF HISTORY OF THE EDUCATION OF DOMINATED CULTURES IN THE UNITED STATES (2007).

[23] *See* Michel Foucault, *Two Lectures*, *in* POWER/KNOWLEDGE: SELECTED INTERVIEWS AND OTHER WRITINGS 1972–1977 (1980); Michel Foucault, *Truth and Power*, *in* POWER/KNOWLEDGE: SELECTED INTERVIEWS AND OTHER WRITINGS 1972–1977 (1980).

[24] *See* Dolores Delgado Bernal, *Critical Race Theory, Latino Critical Theory, and Critical Race-Gendered Epistemologies: Recognizing Students of Color as Holders and Creators of Knowledge*, 8 QUALITATIVE INQUIRY 105 (2002).

[25] *See* Freire, *supra* note 5.

[26] *Id.* at 72.

[27] *Id.* at 75.

[28] *Id.* at 71.

[29] *Id.* at 72.

[30] *See generally* DAVID TYACK, THE ONE BEST SYSTEM: A HISTORY OF AMERICAN URBAN EDUCATION (1974).

[31] For the general discussion of these issues, *see* Freire, *supra* note 5, at 77–79.

[32] *Id.* at 78.

[33] *Id.* at 83.

[34] *See generally* Freire, *supra* note 5.

[35] Lilia Bartolomé, *Beyond the Methods Fetish: Toward a Humanizing Pedagogy*, *in* THE CRITICAL PEDAGOGY READER 27 (Antonia Darder, Marta Baltodano & Rodolfo Torres eds., 2003).

[36] *Id.* at 412 (emphasis in original).

[37] Here we are arguing that the methods and strategies that teachers employ are as important, if not more important, than the theory that undergirds those practices. A teacher may believe that racism is wrong, but may struggle to mediate interactions between students where racism is at play. What largely informs the interactions students have with one another and how they learn to investigate and challenge dominant messages about race, for example, are the opportunities they are provided by the teacher, classroom, and school, to think about issues of power and social relationships in a new

way and to reflect on their assumptions. For more information see Mary Catherine Connor, *Managing the Intermental: Classroom Group Discussion and the Social Context of Learning*, *in* SOCIAL INTERACTION, SOCIAL CONTEXT AND LANGUAGE: ESSAYS IN HONOR OF SUSAN ERVIN-TRIPP (Dan Isaac Slobin, Julie Gerdhadt, Amy Kyratzis & Jiansheng Guo eds., 1996).

[38] *See* Neil Postman & Charles Weingartner, TEACHING AS A SUBVERSIVE ACTIVITY (1969).

[39] Knigge & Cope, *supra* note 2.

[40] LINDA TUHUIWAI SMITH, DECOLONIZING METHODOLOGIES: RESEARCH AND INDIGENOUS PEOPLES. (2005).

[41] *Id.* at 53.

[42] Knigge & Cope, *supra* note 2; Jeremy W. Crampton & John Krygier, *An Introduction to Critical Cartography*, 4 AN INT'L E-JOURNAL FOR CRITICAL GEOGRAPHIES 15, *available at* http://www.acme-journal.org/vol4/JWCJK.pdf.

[43] Jeremy W. Crampton & John Krygier, *An Introduction to Critical Cartography*, 4 AN INT'L E-JOURNAL FOR CRITICAL GEOGRAPHIES 15 (2006), *available at* http://www.acme-journal.org/vol4/JWCJK.pdf.

[44] *Id.*

[45] Sarah Elwood & Helga Leitner, *GIS and Spatial Knowledge Production for Neighborhood Revitalization: Negotiating State Priorities and Neighborhood Visions*, 25 J. OF URBAN AFF. 139 (2003).

[46] Sarah Elwood, *GIS Use in Community Planning: A Multi-Dimensional Analysis of Empowerment*, 34 ENV'T AND PLANNING 905 (2002).

[47] *See* Wendy A. Kellogg, *From the Field: Observations on using GIS to develop a neighborhood environmental information system for community-based organizations*, 11 URISA J. 15 (1999); Rina Ghose, *Use of information technology for community empowerment: Transforming geographic information system into community information systems*, 5 TRANSACTIONS IN GIS 141 (2001); Elwood, *supra* note 46, at 737–59.

[48] *See generally* Mei-Po Kwan, *Feminist Visualization: Re-Envisioning GIS as a Method in Feminist Geographic Research*, 92 ANNALS OF THE ASS'N OF AM. GEOGRAPHERS 645 (2002).

[49] Knigge & Cope, *supra* note 2.

[50] *Id.*

[51] *See id.*; Kwan, *supra* note 48.

[52] *See* Nadine Schuurman, *Formalization Matter: Critical GIS and Ontology Research*, 96 ANNALS OF THE ASS'N OF AM. GEOGRAPHER 726 (2006); Eric Sheppard, *Knowledge Productions Through Critical GIS: Genealogy and Prospects*, 40 CARTOGRAPHICA: THE INT'L J. FOR GEOGRAPHIC INFO. AND GEOVISUALIZATION 1911 (2005); Francis Harvey, Mei-Po Kwan & Marianna Pavlovskaya, *Introduction: Critical GIS,* 40 CARTOGRAPHICA: THE INT'L J. FOR GEOGRAPHIC INFO. AND GEOVISUALIZATION 1911 (2005).

[53] Kwan, *supra* note 48.

[54] *Id.*

[55] Kwan, *supra* note 48.

[56] *Id.*

[57] *Id.*; Mei-Po Kwan, *Is GIS for Women? Reflection on The Critical Discourse in The 1990's*, 9 GENDER, PLACE, AND CULTURE 645 (2002).

[58] Harvey, Kwan, and Pavlovskaya, *supra* note 52.

[59] Veronica Velez, Daniel Solórzano, & Denise Pacheco, Presentation at the American Education Research Association Annual Conference (2007).

[60] *See* William F. Tate, IV, *"Geography of Opportunity": Poverty, Place, and Educational Outcomes*, 37 EDUC. RESEARCHER 379 (2008); Jerome E. Morris & Carla R. Monroe, *Why Study the U.S. South? The Nexus of Race and Place in Investigating Black Student Achievement*, 38 EDUCATIONAL RESEARCHER 21 (2009); Chris Taylor, *Geographical information systems (GIS) and School Choice: The use of spatial research tools in studying educational policy*, *in* SPATIAL THEORIES OF EDUCATION: POLICY AND GEOGRAPHY MATTERS 77–93 (Kalvero N. Gulson & Colin Symes eds., 2007); VELEZ, SOLÓRZANO & PACHECO, *supra* note 59.

[61] VELEZ, SOLÓRZANO & PACHECO, *supra* note 59. This working definition originally emerged from collaborative work that explores the role of race and racism in shaping the historic, evolving spatial relationship between south Los Angeles high schools near the Alameda "Corridor," and their surrounding communities.

[62] *See* Tara J. Yosso, *Whose Culture Has Capital? A Critical Race Theory Discussion of Community Cultural Wealth*, 8 RACE, ETHNICITY, AND EDUC. 77 (2005) (defining cultural wealth as "an array of knowledge, skills, abilities and networks possessed and utilized by Communities of Color to survive and resist racism and other forms of oppression." Yosso's model of cultural wealth, situated within critical race theory (CRT), challenges traditional interpretations of cultural and social capital. *Id.* at 69–91. It shifts the lens away from a deficit view of Communities of Color as places full of cultural poverty and disadvantage. Instead, this essay by Latina/o parents highlights the often unrecognized array of cultural knowledge, skills, abilities, and contacts held by socially-marginalized groups.).

[63] *See generally* LEV S. VYGOTSKY, MIND IN SOCIETY: THE DEVELOPMENT OF HIGHER PSYCHOLOGICAL PROCESSES (1978).

[64] "Alianza" is the Spanish word for "Alliance." The group name has been changed from its real name to protect the anonymity of students.

[65] Solange Castro Belcher, *The Few, The Proud, The Technologically Literate: A Portrait of Technology Pioneers in Urban Schools*, TEACHING TO CHANGE LA: THE DIGITAL DIVIDE (2001), http://www.tcla.gseis.ucla.edu/divide/politics/besser.html.