Technology Out of School: What Schools Can Learn From Community-Based Technology

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Teaching and learning in out-of-school contexts has a long history of successfully adapting pedagogy to local and current needs of student participants. The innovative uses of technology, the flexible social organization, and the everyday relevance of out-of-school activities make these learning contexts ideal for innovation. Almost two decades of studying the benefits and challenges of creating innovative technology-based learning environments in after-school settings ostensibly demonstrates their cognitive and social benefits (Martinez & Vásquez, 2006; Vásquez, 2003). In this chapter, I draw on this work to theorize the feasibility of transporting the lessons learned about teaching and learning in this kind of context to the classroom setting. I begin with a brief sketch of the social conditions in contemporary America that call for the imaginative use of information and communication technologies (ICT) as critical tools for learning, then describe a technology-based intervention called *La Clase Mágica* that has shown tremendous promise for addressing the social and academic needs of language minority youth (Vásquez). I follow with a discussion of two types of valuable lessons that could be incorporated into classroom teaching and learning: those that easily fit with traditional modes of pedagogy and others that would require a "new paradigm of thought" for their implementation.[1]

Contexts for Change

At the onset of the 21st century, the reality was that most schools had the technology and the connectivity to explore teaching and learning in creative and unconventional ways. The spread of Internet access had been unprecedented, growing exponentially into every aspect of the human experience. In the 1990s, President Bill Clinton's "Technology

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Literacy Challenge" addressed the issues of access and connectivity in schools across the United States. Today, nearly every school is equipped with computers and most families have a computer at home. The prediction that digital literacy would be a prerequisite for full participation in an information-based, global society is clearly evident in the social world, if not in the classroom of today (Pachon, Macias, & Bagasao, 2000). In the labor force, the uses of information technology are growing faster than the number of individuals with the knowledge and skills required to advance that technology. Even attitudes toward computers have shifted from an initial distrust and annoyance to a common belief that computers improve the quality of both education and life. Families who have traditionally not been in the forefront of technological advancement are increasingly using the Internet as a way of maintaining family ties, through email, instant messaging, and web postings.

In this new social reality, the most critical problem facing teachers is how technology can be used to "define educational visions, prepare and support teachers, design curriculum, address issues of equity, and respond to the rapidly changing world" (Gordon, 2000, p. 14). Schools and teachers face three critical challenges in adapting education to meet the social and economic realities of this technology-based globalized world: (1) boosting the slow pace of incorporating new technologies into the core of the instructional program; (2) shifting the notion of technologies as a learning tool or enrichment activity to that of a "functional prothesis" that extends the power of the brain for learning (Battro, 2004); and (3) bridging not only the digital but also the cognitive gap that underserved populations suffer around the world (Warschauer, 2003). In short, ICT have yet to form the basis of the instructional program, exceed the traditional pedagogy in fundamentally new ways, or be applied uniformly across income and racial groups. The innovative use of technologies is the exception rather than the rule, happening in select classrooms where individual teachers have both the vision and the skills (Cuban, 2001).

The Slow Pace of Incorporation

By all indications, a great majority of teachers do not take advantage of the available access and connectivity to the Internet and do not use information technology to achieve new ways of enhancing the intellectual capacity of learners, relying instead on the customary acquisition of bits of knowledge that are disconnected from the learning context. In spite of the pervasiveness of advanced technologies and its growing

significance in peoples' daily lives, teachers continue to use computers sparingly, as enrichment activities, and/or to "sustain patterns of teaching rather than to innovate" (Cuban, 2001, p. 135). Paradoxically, this pattern does not change even in places where the local context is technologically advanced, such as the Silicon Valley in the San Francisco Bay Area, the acclaimed hotbed of the information revolution. Cuban, for example, found that among the teachers he studied, 85% of them rarely used computers, if at all. Teachers considered "serious users" (10% of them) used computers only once a week and less than 5% of teachers integrated computers into the regular curriculum and instructional routines. In short, very few teachers used computers as a central component of the instructional program.

The entrenchment of the culture of schooling is the likely source of this reticence (Gallego, Cole, & LCHC, 2001; Vásquez, 2005). As Elmore (1996) has found, the core of schooling—i.e., the teaching and learning—is resistant to change. In fact, the organizational structure of the classroom has not changed for the past 2,000 years. The teacher continues to stand in front of a group of learners, seated neatly in a series of rows, as the only authority in the room. It is exactly this hierarchical structure, the strict adherence to a Western canon, and the singular focus on the individual that the new vision of a technology-based education threatens to disrupt with the availability of alternative sources of knowledge outside the classroom and the facility for collaborative engagement in the generation of new knowledge.

Impediments to New Forms of Transformative Pedagogy

The application of innovative and cognitively enhancing technology-mediated learning is indeed a tall order for overworked teachers and overstressed schools. High-stakes testing fueled by the accountability craze (McNeil, 2000; Valenzuela, 1999) and underpreparation of teachers does not allow teachers the time or the energy to develop new forms of teaching and learning. As Linda McNeil points out, the accountability craze of the last decade strips teachers of their creativity and their expertise. According to the California Teachers Association (n.d.), schools are spending more time on a narrow curriculum and filling out forms in order to comply with the government's demands for data and higher scores. These demands provide little time for experimentation and cross-discipline collaboration, critical foundational elements of technology-based curriculum. Under the specter of a reclassification to "Program Improvement Schools"—i.e., schools that have failed to demonstrate Adequate Yearly Progress—teachers and

schools are hard-pressed to demonstrate progress. They have little or no energy for the risk-taking that is needed to explore and discover new avenues for developing technology-mediated instruction. To complicate matters, accountability measures do not serve as diagnostic tools that can generate more strategic instruction, but rather focus on program evaluation. Thus, the "opportunity costs," the time teaching to the tests that could otherwise be used for instruction, are especially high and fall particularly on English learners and students with disabilities (Zellmer, Frontier, & Pheifer, 2006).

Cognitive and Digital Divides

The unevenness of the material access and the prevalence of the cognitive and digital divide along socioeconomic and racial lines are vexing problems for technology-based reformers. Poor schools, for example, are less likely to provide Internet access than wealthy schools (DeBell & Chapman, 2006), preventing minority youth from immersing themselves in "an ocean of possibilities" afforded by the Internet (Battro, 200482). Charron (2005) found that 38% of Spanish-dominant learners and low-income students respectively rely solely on schools for Internet access. Teachers who do not want to single out students often do not assign homework requiring information technologies, handicapping them even more.

Warschauer (2003) notes that the intellectual quality and literacy building power of computer activities are unevenly distributed along ethnic and economic lines. Students from higher income backgrounds receive greater access to cognitive enhancing activities, while minority youth from low-income communities are differentially relegated to repetitive, uninspiring activities. One group is provided with a motivating and enlightening mechanism for learning (Schofield, 1995) that research is beginning to link to academic achievement (Pastor-Relaño & Vásquez, 2005) and the other is relegated to the realm of irrelevance (Vásquez, in press), managed through "drill and kill" activities. The result is what Warschauer calls "social and economic stratification or exclusion" (p. 29), which is compounded by the likelihood of these students also attending underfunded schools with a high proportion of unqualified teachers (Vásquez, in press).

The problem of computer use in education is not limited to minorities; it is more complex than that. The slow pace of the incorporation of advanced technology-based pedagogy and the entrenchment of out-of-date pedagogy limits the development of what Ulmer (2002) calls "electracy"—the skill and facility necessary to exploit the full commu-

nicative potential of new electronic media—as well as cognitive development, visual intelligence, and access to information skills that potentially facilitate communication, improve education and labor market prospects, and accomplish everyday tasks quicker and better (DeBell & Chapman, 2006). In an age in which *information* rather than money or goods is the valued commodity, where creativity and flexibility are privileged, and multiple languages and cultures are assets rather than liabilities, the absence of these skills is debilitating. It is critical that the educational system of the United States produce workers and citizens for a world saturated with electronic media. To maintain its prominence in the international community, education must make a significant and aggressive shift from an industrial model of education to one that is based on knowledge and information, and it must be done within a very short time to catch up with a future that is already here (Vásquez, 2006a).

After-School Technology Intervention

This crisis in education makes after-school programming an attractive intersection to examine technology-based pedagogy. Outside the school's field of ideological production (Bourdieu, 1977), away from the accountability forces and the top-down administrative structures, researchers and practitioners who focus on after-school have much more flexibility to imagine and institute ideal worlds where learners can achieve optimal possibilities with the use of technology (Vásquez, in press). Out-of-school technology, that is, technology used in community-based and educationally oriented after-school programs, shows much promise for providing valuable lessons about creating innovative learning environments for all students and for facilitating the academic and social integration of a growing number of minority youth (Cummins, in press). These new technology interventions can more flexibly encourage the requisite skills needed for a knowledge- and information-based society than the traditional school curriculum, which is tied to a prearranged scope and sequence regime. Suárez-Orozco and Qin-Hilliard (2004) admonish us that the skills privileged in a globalized world are very different from those being promoted by the schools:

> Taking multiple perspectives, reversing mental routines, and articulating multiple hypotheses from a common set of facts and working through the logical and rational vectors that would best explain those preexisting facts are crucial features of human intelligence. (p. 5)

The malleability of after-school contexts make them ideal venues for testing the viability of innovative technology-supported learning environments, nonstandard sources of knowledge, and futuristic visions of a new world order with its corresponding vision of education, the learner, and the citizen (Vásquez, in press). The loose power structure provides the flexibility to tweak the system according to newfound knowledge or the availability of new technological advances and allows for the discarding of methods and technology that do not fit the ever-changing goals and objectives of the respective contexts. The scope and sequence regiment of school is sidestepped for a flexible pace and progression determined by individual interest and ability.

The Benefits of After-School

With the kind of freedom to diverge from the formality of school, what can after-school teach traditional school about creative technology-based pedagogy? Extant research and almost 2 decades of work in after-school settings leads me to the conclusion that there is much promising practice in after-school programs that could be useful during regular school hours. Nationwide, research on after-school programs repeatedly shows the positive impact it has on participants' safety, behavior, social skills, and self-confidence (Gayl, 2004; Heath & McLaughlin, 1994). The After School Corporation (TASC) of New York; the 21st Century Community Learning Centers (21st CCLC); the Extended-Service Schools (ESS) initiative; and San Francisco Beacons Initiative (SFBI) show that participation in after-school programs has a positive effect on grades and work habits, behavior in school, and emotional adjustment and peer relations, and promotes a greater sense of belonging to the community.[2] The National Institute on Out-of-School Time (NIOST) and the Forum for Youth Investment (2002) identify the following connections between participation in quality after-school programs and traditional school:

- In supporting the development of a range of non-academic competencies—i.e., social and critical thinking skills—after-school programs support young people's academic learning.
- The frequent and close contact with caring and encouraging adults provides young people with critical developmental input that helps to ensure academic success and promotes full engagement and preparation to succeed in school.

- After-school programs offer rich alternatives that often are not available during the regular school day, providing further opportunities for development and enrichment.
- After-school programs eliminate the consistent barriers to learning faced by young people who may otherwise have been unreachable because of disruptive behavior, lack of interest, poor sense of self, or repeated failure in more structured contexts.
- After-school programming is part of a larger "developmental space" that intentionally links to other settings in which young people grow and develop—e.g., counseling, health, and recreation services (p. 6).

The Fifth Dimension

One of the foremost after-school initiatives that has attempted to address the cognitive, academic, and social needs of children has been sponsored by the Laboratory of Comparative Human Cognition (LCHC) at the University of California, San Diego (UCSD) (Cole & The Distributed Literacy Consortium, 2006; Vásquez, 2003). Much of this work has centered on an activity system called the Fifth Dimension, which is designed to link the resources of the university with community institutions to both study and promote the learning potential of children using a computer-based pedagogy. Collaborators at LCHC began by trying to address the educational needs of learning disabled children within the school structure, but found the after-school hours more flexible for manipulating both the curriculum and the relations of power to achieve maximum interaction between children and adult participants (LCHC, 1982). With support from undergraduate students enrolled in a university course, researchers created a fictional world in which the power of adults was diminished in direct proportion to the increases in the power of the participating children. The model system evolved into a university and community partnership held together by an after-school computer-based activity founded on play and education and an undergraduate course that applied theory to practice as a means for creating and studying innovative learning environments (Cole, 1997).

Within these conditions, researchers and practitioners have continually tweaked the ecological learning system in response to the emergent needs and interests of the participants and the learning contexts. In pursuit of both promoting and studying learning, this approach aims at opening zones of possibilities for young participants who attend the after-school sites (Moll & Greenberg, 1990). Adult–child collaborations

are organized to create an opportunity structure in which the learner collaborates with a more experienced peer (Vygotsky, 1978). This approach has provided researchers and participants alike the opportunity to test the potential of ICT to both create innovative learning environments and to study its effect on language, literacy, and cultural development. As Lucy Friedman, president of TASC, says in the foreword to the book written about the Fifth Dimension program (Cole & The Distributed Literacy Consortium, 2006):

> The philosophy that undergirds the Fifth Dimension—that children will benefit from a learning environment that is not simply "more school" but that does support what is learned during the school day—is reflected in the computer activities, which are less structured and more fun than those in school and yet are not just games. (p. xiv)

After-school programs modeled after the Fifth Dimension have sprung up around the world and seek to study culture and cognitive development in nonhierarchical, computer-based learning environments that are based on play and education. One of these variations is *La Clase Mágica*, a bilingual/bicultural adaptation focused on the academic achievement of language minority youth and their representation in higher education. In 1996, when the University of California dismantled affirmative action, a combination of the *La Clase Mágica* and Fifth Dimension models was adopted at all of the university's nine campuses under the umbrella of a multicampus, intersegmental faculty initiative called UC Links. At the height of state funding, UC Links sponsored up to 40 after-school programs in low-income, minority communities (see http://www.uclinks.org for more information).

Today, researchers worldwide have appropriated this methodology and constructed after-school activity systems to study local issues relating to language and literacy practices (Gutiérrez, Asato, Santos, & Gotanda, 2002; Moll, 1992), the relationship of school to the social integration of minority groups (Mijandos & Romero, 2006; Vásquez, 2003) and the linking of important contexts to human development (González, Moll, & Amanti, 2005).

La Clase Mágica

Building on the Fifth Dimension's protean character, *La Clase Mágica* added bilingualism and biculturalism to the original curriculum, an extended "developmental space" to its organizational structure, and a strategic focus on the melding of old and new knowledge to its

computer-based pedagogy (Vásquez, 2006b, in press). Using Vygotsky's interventionist methodology, *La Clase Mágica* made the study of the academic achievement of minority youth and their representation in higher education key components of its research agenda (Vásquez, 1996). It sought to link important contexts for human development through a cross-system infrastructure of collaboration for sharing costs, expertise, and newly generated knowledge. Examples of the developmental spaces making up this system include the Head Start Program, the recreation room at two housing projects, the education center at an American Indian reservation, the university and community college classrooms, the enrichment hour at school, and the research staff meetings. Aligning these learning contexts has allowed us to metaphorically conceive the proverbial "educational ladder," and thus, study the developmentally driven changes in pedagogy and uses of technology that take place at each level of the system.

In 2007, *La Clase Mágica* encompassed a federation of six community-based programs spread across San Diego County. Jointly, UCSD, Palomar Community College, and the Center for Academic and Social Advancement (a non-profit organization that grew out of the community effort at the original site) provide the intellectual resources and institutional support to carry out the daily activities of the after-school sites. Every year, the two higher education institutions together provide the sites with approximately 90 undergraduate students to work closely with the child participants. Almost 25 community and education units across San Diego County constitute the functional system that serves the educational needs of approximately 300 children and 25 parents each year.

A three-quarter practicum course on Child Development at UCSD offers one-quarter that focuses specifically on the viability of information and computer technology for making the difference in bridging the cognitive and digital divide that minority learners face.[3] Applying theory to practice—i.e., mobilizing sociohistorical theories of learning and development—undergraduate students create opportunities for learners to achieve their optimal potential as they move through a series of computer-based activities involving Internet searches, educationally oriented computer games, and online chats with an electronic entity called *El Maga* (see Vásquez, 2003 for details). Over the years, student analyses have questioned whether the capacity of computer technology can bring about substantive change on its own power or whether it requires a specific type of technology-based pedagogy to accomplish the goals of enhancing learning and development in innovative ways. These

deliberations have been instrumental in driving the continuous change and reflection that characterizes *La Clase Mágica*.

Much of the attraction of the children to *La Clase Mágica* has been the series of computer games that are organized in a maze format, setting the stage for collaborative dialogue between the learners and their undergraduate *amiga/os*. Importantly, the maze also sets up the context for creative imaginings about their capabilities vis-à-vis the endless possibilities that the games afford them for learning. As the children move from imaginary room to imaginary room, solving problems and accomplishing tasks, they master new information skills connected to the games in a natural and uneven manner. The learner not only practices everyday skills and language embedded in the activities; he or she also acquires the norms and expectations of an acculturated member of the system. From the very first step—when the child is asked to choose one of four possible points from which to enter the maze—the journey demands active and deliberate participation. At the end, having made hundreds of other decisions about which direction to take, what game and level to play, and what language and culture to use, the child exits the maze as a transformed being—one with expert knowledge of how things work at *La Clase Mágica*. At that point, the first-level participant assumes the role of Wizard Assistant, the highest rank of expert in the system (apart from *El Maga*) (see Vásquez, 2003 for details).

The changes in social conditions as a result of the economic and cultural processes taking place worldwide have increasingly pressed *La Clase Mágica* to alter its theoretical foundation and research lens to reflect the new realities of the 21st century (Vásquez, 2006a, in press). In particular, its focus on the affordances of technology-supported environments has intensified to include the new competencies that are privileged in a globalized world—e.g., financial literacy, entrepreneurship, health and nutrition, environmental studies, and digital literacy. At the beginning of its 19th year—the fall of 2007—*La Clase Mágica* opened with multiple Internet and computer activities that fostered the development of global citizenship skills and sensibilities; global awareness; cultural understanding; environmental concern; and health awareness.

What Can Schools Learn From After-School Education-Oriented Programs?

Much of the work that examines the impact of after-school on children's learning makes claims about the benefits of participation in after-school programs on classroom learning. For example, Blanton,

Moorman, Hayes, and Warner (1997) make the case that the special experience in Fifth Dimension after-school programs is transferable to the school. Penuel and Kim (2000) and Martinez and Vásquez (2006) also point out the positive effects of after-school programs on participants' learning and community engagement. However, it is not the transferability of learning from one context to another that is addressed in this chapter; rather it is the pedagogical insights that have been gained from almost 2 decades of continuous tweaking of a particular kind of after-school computer-based pedagogy. Many of these lessons can be transported to the classroom, but only under two separate conditions: (1) that these lessons can be applied within a traditional pedagogy; and (2) that the instructional program welcomes a new "paradigm of thought," much like Luke's (2000) notion of "cyber-school" (p. 81), that incorporates a new cultural perspective, a new language, and new forms of interrelating with both people and media.

What Is Readily Transportable?

Hundreds of course studies that my "Practicum in Child Development" undergraduate students have carried out in after-school programs, situated in both schools and community-based institutions, reveal four key lessons that teachers can readily adopt within the classroom or during innovative playtime activities:[4]

1. The importance of the social aspect of computer-mediated learning.
2. The essential value of collaborative inquiry activities in learning and development.
3. The social and cognitive value of mixing play and education.
4. The advantages of building partnerships with families, community, and business.

Rich social context. Our research consistently confirms extant research that claims that the computer alone cannot enhance cognitive development or modify social behavior (Crook, 1994; Schofield, 1995). Learning is highly dependent on a dialogically rich social environment (Cummins, in press; Vásquez, 2003, in press; Wells, 2000), however, around the computer, it is ever more crucial. Warschauer (2003), for example, shows this quite clearly in his study of several contexts in which computers were made available without the technical assistance and support of the community. He showcases an Irish town and the

"hole in the wall" experiment in New Delhi, India as examples of "people's ability to make use of that device and line to engage in *meaningful social practices*" (p. 38, emphasis in the original). These same findings are confirmed by the studies of novice anthropologists—the undergraduate students enrolled in the course linked to *La Clase Mágica* field sites.

Students have repeatedly noted that when children are placed in front of the latest in advanced computers, the use of headphones and computer programs such as "SuccessMaker" deprive them of critical elements for learning and development—i.e., social cues, expert assistance, and the opportunity to explore. The difference between the nature of *La Clase Mágica's* nonhierarchical and self-directive structure in which goals are achieved collectively in a free flow manner and the more structured individually centered classroom was noted in many of the field notes written by students who carried out their practicum at two sites that were situated in schools (Vásquez, 2005). The "culture clash" was even more pronounced when the activity was held in the classroom during prep time and within earshot of the teacher. The students documented in their field notes that although teachers did not take part in the program activities themselves, they insisted on a turn-taking structure in adult–child interactions and often intervened from across the room to discipline children for not following school rules, telling them "not to talk, goof off, or speak without raising their hands" (student field notes, February 1, 2007). At the other within-school application of *La Clase Mágica*, the school opted to use only SuccessMaker, a computer-based learning software based on a behaviorist learning theory of drill and practice.[5] The undergraduate students who attended the site reported that the computer had become a form of "computerized ditto sheets" leading to boredom and disengagement (student field notes, January 18, 2007). This same student further documents the obstacles to innovative uses of the technology that children encounter playing SuccessMaker:

> If the subject gets a certain number of questions correct, the questions will start getting more difficult, if the child is not doing so well with problems, he or she stays at the same level. If they pass 20 or more problems with 80% or more problems correct, they are free to use the program to access the Internet. On the Internet, they are *only* allowed to go to PBSkids.com which has games, coloring activities, and stories based on the different children's TV shows (including Barney and Teletubbies). A majority of the students do not receive 80% or better on their section and therefore do not get to use the Internet.

Play and collaboration. Two constituent elements of the technology-based pedagogy of *La Clase Mágica*—collaboration and the mixture of play and education—are critical aspects of cognitive and social development (Cole, 1996; Rogoff, 1998; Vásquez, 2003; Vygotsky, 1987), particularly around the computer. Vygotsky, for example, claims "with collaboration, direction, or some kind of help, the child is able to do more and solve more difficult tasks than he can independently" (p. 209). Rogoff goes further to say that collaboration is a cognitive process. This central focus on collaboration, in particular between expert and novice participants, has been foundational to the development of the culture of collaborative learning on which the Fifth Dimension model is based (Nicolopoulou & Cole, 1993). Thus, one of the goals of technology-based after-school programs based on socio-historical theories of learning and development has been to provide opportunities for novice learners to reach their optimal potential in collaboration with those with more expert knowledge and skills. The undergraduate assistants, called *amiga/os* at *La Clase Mágica*, are charged with scaffolding the children's progress in socially rich collaborative relations of exchange that make enhanced social, academic, and technical skills possible.

Although programs differ significantly in terms of their structure and goals, it is safe to say that after-school programs promote positive youth development across multiple domains (Eccles & Gootman, 2002), particularly when they incorporate play and collaboration as central features of their activities. Around the computer, we have found that the invaluable experience of expert peers facilitates the development of the child's attention span, his or her orientation to the task, longer and more meaningful engagement, and the fine-tuning of social skills. Undergraduate researchers frequently focus their course research on the difference in collaboration around homework and computer activities and invariably confirm Schofield's (1995) finding that collaboration around computer use is richer, longer, and more engaging and enjoyable than other classroom activities. The following segment of a longer field note written by one of the undergraduate students illustrates the unexpected but valuable learning that can emerge from computer-mediated collaboration:

> Gina was coloring a picture on the computer of a boy looking into a pond, and she made this boy's hair black and his face pink. The *amigo* asked Gina what nationality she thought the boy in the picture was. At first the child said, "I dunno," but then the *amigo* explained what nationality meant and gave an

example of a nationality like European. This inspired a conversation about Gina's nationality as well as what she thought people of other nationalities looked like. (Student field notes, February 7, 2007)

In the classroom or the lunchroom, this type of goal-directed interaction with peers is often not permitted. Instead, as our research in two schools reveals, teachers admonished children for talking to their peers, limiting their abilities to develop their social and academic skills (Vásquez, 2005). If, as Schofield (1995) points out, computers in the classroom make it difficult for teachers because they "put new and different demands on teachers and can change classroom process and structure" (p. 191), then they can try to incorporate computer activities outside the instructional program—during free play, recess, homeroom, or in-class play-stations when the teacher can get extra help in the classroom from parents, aides, volunteers, or mentors.

Developmental spaces. Another important lesson from after-school that can easily be taken up by the schools without challenging the integrity of the traditional pedagogy is the inclusion of important contexts for human development as mechanisms for bringing about effective change in the individual as well as the society. The latest reports of the Policy Studies Associates in Washington (Reisner, 2007) has found that "when all parties with responsibilities for and interests in the welfare of youth, especially disadvantaged youth, unite to engage young people in high-quality after-school experiences, communities are more likely to succeed in promoting positive development for the largest number of youth at risk" (p. 1). Thus, the social milieu—i.e., relevant cultural systems (i.e., the family, community, and educational systems) and multiple institutional contexts (i.e., the individual schools, research units, funding organizations, and various learning sites such as the classroom, after-school learning settings, and staff meetings)—influence child development in multiple ways (Bronfenbrenner, 1977; Rogoff, 1994; Wells, 2000; Wertsch, 1985) and must be taken into consideration in planning a technological intervention (Warschauer, 2003). Building an elaborate cross-system collaborative provides a socializing system for the developing learner, citizen, and worker (Martinez & Vásquez, 2006).

This cross-system collaborative effort supports the mission and development of each of its integral components, creating the opportunity for systemic change. Structurally, these social and electronic linkages help bridge distances, social groups, and education levels to

communication and coordination frameworks that correspond effectively with the K–16+ educational pipeline initiatives being mobilized in universities across the country. The outcomes of such relationships create new pathways to circulate accumulated knowledge throughout the system (Vásquez, 2003). Thus, each part of this multilevel system contributes to the formation of new visions of learners and the institutions that serve them. As more of these types of partnerships spring up all over the country in an effort to work together in supporting children's learning in school, even sharing sensitive data such as children's test scores (CNN, 2006), the classroom is bound to change.[6]

Other valuable lessons can, of course, be garnered from after-school research and practice. However, as I argue elsewhere (Vásquez, in press), their transportability to the classroom is contingent on the kind of learning environment that is available, goals and objectives that are delineated for the individual, and a concern for learning that is collaborative, dialogic, and literacy enhancing as well as deep, active, and community-based (Cummins, in press; Vásquez). The technology-based pedagogy that I propose grows out of years of testing the viability of innovative technology-supported learning environments, exploring nonstandard sources of knowledge, and imagining new visions of education from a position of flexibility and relative freedom (Vásquez). Given the right combinations of conditions, I believe that it is not only possible but also essential for this kind of pedagogy to flourish in the classroom.

While this may seem straightforward for typical classroom instruction, the experience of our two after-school programs in schools reflects a complex tension between the ideals of the technology-based pedagogy that I propose and more conventional education systems. Problems such as technological, institutional, and theoretical boundaries, experienced in all kinds of technology-based programs as Yagelski and Powley (1996) noted, are amplified in the schools where we worked. Although our activities were set apart from the instructional program, at times these boundaries seemed insurmountable obstacles to our theoretically informed pedagogy. Our programs faced technical standards—i.e., firewalls and platforms—and official guidelines—i.e., time schedules, procedures, acceptable images—and theoretical and practical approaches to the learner, content, and instruction that strained insider–outsider relations, thwarted the project's culture of optimal learning, and intensified disciplinary issues (Vásquez, 2005). These experiences highlight the tensions that an "outsider" agency has within the structure of the school, as well as

the difficulty that a new way of thinking encounters vis-à-vis the school culture (Gallego, Cole, & LCHC, 2001)

The toughest obstacle for an "after school" pedagogy is the issue of what type of learning is acceptable in the classroom. Learning in after-school programs as reported by Penuel and Kim (2000), Miller (2003), and others seems readily transportable; however, it is the kind of learning that goes beyond what is possible with pencil-and-paper tasks—learning which may be emergent, unplanned, or unidentifiable and will face the greatest scrutiny and lack of acceptance (Vásquez, in press). Cross-disciplinary research advocated by Gardner (2004) and by Gee's (2003) theories about the 36 learning principles he believes are designed into video games (and by extension into the surrounding social context) have received little uptake by reformers in spite of the fact that they "fit better with the modern, high-tech, global world today's children and teenagers live in than the theories (and practices) of learning that they see in school" (Gee, p. 7).

A New Paradigm of Thought

In spite of this apparent reticence, it is critical to carve out and experiment with the possibilities of a new paradigm of thought. We must envision what it would be like if education were truly about providing optimal and relevant opportunities for learners to be prepared for the social, technical, and economic realities of the 21st century. Such a vision calls for a technology-based pedagogy that embodies transformative goals for the use of technology (Schofield, 1995, p. 224). In sociocultural terms, this means that the goals of technology should be the transformation of both the classroom culture and the learner's developmental trajectory from novice to expert at whatever level they find themselves in. Using Cole's (1995) notion of culture-as-medium, this calls for organizing, *a priori*, the right combination of conditions to help children learn and develop in new and emergent ways. Our research and practice over the years offers three insights that lays down the foundation for a new paradigm of thought for technology-based education:

1. Seeing the learner, learning context, and content in new and emergent ways.
2. Working within a culture of optimal learning.
3. Positing the computer as a mindtool rather than a "ditto machine."

New Ways of Seeing

One of the major lessons we learned from working within the context of the school is that our project staff had different ways of seeing the learner, the role of the teacher, the learning context, and the content than school personnel did (Vásquez, 2005). Outside of the material and philosophical motivations for enhancing children's achievement and the social development both the school and *La Clase Mágica* hoped to encourage, we each held divergent theoretical understandings regarding the abilities of the learner and the proper course of action. We saw the learner in a state of readiness, willing and able to move to the next level of development with expert support. The school personnel, on the other hand, labeled the learners who were referred to the program as "at-risk" and in need of remedial treatment. In the classroom, children's learning was guided toward a specific skill by the didactic guidance of the teacher. At *La Clase Mágica*, children were guided by movement inscribed in the representation of a 20-room maze printed on an 8×11 sheet of paper (see Vásquez, 2003 for details). In the classroom, children were motivated by the individual evaluation of their performance; at the after-school program, by the movement to another computer activity that resulted from collaborative engagement with peers and/or undergraduate pals. In the classroom, fear of failure and teacher disapproval motivated children to stay on task. At *La Clase Mágica*, the *amiga/os*' gentle prodding and their own driven motivation to "win" kept them engaged.

The vision of the "new classroom" that I propose posits the teacher as *collaborator*. The adults—both the undergraduate students and the site staff—are theoretically informed to build on the child participants' multiple knowledge sources and their variety of capabilities. Their goal is to scaffold the learners' optimal potential by providing guiding questions, mnemonic devices, personal experiences, and Internet search engine demonstrations. Our experiences in the two in-school sites confirmed Luke's (2000) assertion that once teachers (authority figures) are free from "the 'batch processing' of students through a 'mass-market basic curriculum' they will 'manage the pace of their [students'] online learning'" (p. 91). That is, when undergraduates and adult staff concentrate on extending the learning potential of their child collaborators at the child's own pace and direction, behavioral issues are infrequent. When hierarchical, rule-oriented relations and designated content are imposed on the children, behavioral problems increase.

Misbehavior grew out of the tensions between the culture of *La Clase Mágica* and the culture of school—e.g., talking without raising hands, getting too excited about completing an electronic activity, and speaking too loudly with co-collaborators. This seeming "free-for all" ran counter to expectations of the classroom (Gallego, Cole, & LCHC, 2001; Vásquez 2005), and many times, it was I who ended up in the principal's office explaining the need for children to speak freely in collaborative engagements around the activities. I explained that, instead of focusing on managing social and personal behavior, the role of adults was to dialogically scaffold the progress of the learner through a continuous series of what Griffin and Cole (1984) call "leading activities" leading to the learner's proximal development.

Our studies found the content of our activities as open and emergent as the role of the teacher and the abilities of the learner previously described. Content is not scripted by one monolithic culture, but is open to new sources of knowledge that frequently go outside the learning context and the adult's experience—moving beyond earlier notions of a *culturally* relevant curriculum to one that is *globally* relevant. Our data from the after-school site located at a local American Indian reservation, for example, teach us that conceptions of multiculturalism and culturally relevant curriculum were appropriate for one particular target group—in our case, Mexican origin children—and not applicable to another. We learned that it is possible and desirable to make connections to the children's own lives and to the lives of those outside of their local communities through a variety of literacies—media literacy, print literacy, and electrecy. The learners' multitude of understandings of the world was easily juxtaposed with those of others' experiences near and far. We found that computer and information technology provided excellent opportunities for these kinds of activities, and provided the vehicle for maintaining a living history, reinforcing and/or acquiring the local language or second language, and learning about learners' similarities and differences from other cultural groups.

A Culture of Optimal Learning

The new paradigm of thought that I propose builds on Nicolopoulou's and Cole's (1993) notion of the *culture of collaborative learning* in which adults and children negotiate meaning as equal and collaborative partners. In nonhierarchical relations of exchange, the adult and child draw on multiple worlds to solve problems or co-construct new knowledge. Our research lens has increasingly zoomed in on the significance that optimal goals play in the culture of the six after-school sites we have

studied for years. Participation and collaboration, of course, continue to play a critical role in cognitive development; however, what I argue is that optimal learning is foundational to the goals and objectives of the learning context. We found that the right combination of conditions that help the learner grow and develop to his or her optimal potential included intent collaboration, a cognitively rich environment, and the validation of the learner's cultural and linguistic resources. These conditions made it possible for the learner to engage actively and dialogically in activities in which he or she could draw from multiple resources to achieve new understandings of the self and the world.

To achieve a new paradigm of thought in which we can meet these kinds of goals, the culture of optimal learning has to be written into the very fabric of the system of artifacts that make up the learning context. At *La Clase Mágica*, this included the instructional guides called task-card, adult–child interactions and the computer games and activities that constituted the learning context. Every interaction, every activity must be structured to open zones of possibilities for learners to develop their interests and their emergent skills. Learners must be afforded their complete linguistic, sociocultural, and academic repertoire as intellectual tools, along with access to alternative ways of knowing that are available in and outside the learning context (Gutiérrez et al., 2002). The facility of ICT to access, store, and create knowledge is integral to this type of learning ecology. Thus, "the power to know what others know" is put in the hands of the child participants (Papert, 1993). At an early age, child participants will be able to mobilize their intellectual resources to access the technical and cultural capital they need to prepare for higher education and a global community of learners.

Mind Tools

Typically, activities in after-school programs encourage participants to search the Internet for information that is purposeful, timely, and outside the learning context. They search for information that will help them move through a game after they complete their homework or complete a photographic journal on such topics as low riders, the latest hip hop stars, or their family's history. Alone or in collaboration with a peer or adult, they seek knowledge that leads them to new ways of thinking, doing, and seeing themselves (Gee, 2003). According to Gardner (2004, p. 254), this is a contrast to the measurable bits of "information, concepts, [and] definitions" that are called for in the classroom. Rather than simply managing or entertaining, the computer

can provide endless opportunities for child-generated inquiries that lead to discovery, creation, and management of new knowledge. Its feedback capabilities allow the learner to make an imagined situation visible, explore its infinite possibilities, and uncover some of one's own inherent potentialities. Achieving such a level of engagement with computers and information technology heightens the possibility for developing creativity, a skill highly regarded in the global economy. As the "power to know" shifts from the teacher to the learner, learners learn a new way to organize experience. They encounter a set of expectations about what it means to know and understand (Turkle, 2004, p. 97) and they become critically aware of the role they play in the world.

Playing computer games and exploring the Internet are some of the ways in which computer and information technology spurs the flight of the imagination. Learners can take a task, collaboratively develop it, change it completely, or reject it and start something altogether new. It is critically important to emphagize the difference of these technology-enhanced environments in particular—computer games have cognitive value, in contrast to what many people may believe (Gee, 2003). Learning is both the process and the product of good computer games, not only because of "the theory of learning" inherent in their design (Gee), but because they also lend themselves to a rich dialogic context for language and literacy development. Our research and on-the-ground experiences at *La Clase Mágica* demonstrate that the use of computer games not only facilitates learning but also encourages it. As Hopkins (2005) points out, "Technology can be used to engage students in ways that other tools cannot," in particular with students who have little access in the home—students from low-income minority backgrounds who can greatly benefit from a deeper engagement in cognitively enhancing activities.

These three foundational components of a new paradigm of thought are critical to an education of the future. Of course, they can be adapted to classroom technology-based instruction in varying degrees but the ideas of a new learner in a new context with technology-supported content and instruction are irreducible. The teacher-coach, for example, could reject commercial games for activities that free the student to actively and critically explore the boundaries, meanings, and (inter)relationships of self, the task, and the learning environment and/or that include any other learning principles that Gee (2003) identifies. He or she could very well set aside the notion that students must first complete a prescribed level of competence before introducing new material and allow students of different abilities to collaborate on unfa-

miliar material. And, most importantly, teachers could refuse to use ICT for "drill and kill" activities and use them for mind-extending explorations.

An Alternative Vision

The new model of education that I propose marks a shift from privileging select groups, content, and theoretical perspectives to a more open type of education that I call an "education of the future" (Vásquez, 2006a)—a future that the recurring innovations in technology reminds us is already here. Far-reaching, complex, and interactive change is the catalyst for a system that must be responsive to a world marked by a new emphasis on globalization. It is an education that prepares individuals to be citizens as well as workers in a world that is in constant flux at every level of our social experience. At no other time in history has it been more evident that there is a blaring disconnect between technology-based instruction in the classroom and what students are able to do with technology outside the classroom. They come to the classroom versed in the social and technical possibilities afforded by iPods, virtual worlds like Second Life and My Space, and the ubiquitous cell phone. They know how to seek, store, replay, share, and construct knowledge in ways that counters the unilinear, unifocal knowledge transmission of the classroom.

The aim of this chapter has been to offer lessons we consider valuable for optimizing children's learning potential, in hopes of helping teachers crack open the core of schooling that has been so resistant to change (Elmore, 1996). Although these lessons were acquired in contexts with a relative amount of freedom to tweak the system according to emergent needs and interests, they can still provide a window for what is possible and necessary if schools are truly to attend to achieving the optimal potential of their students while preparing them at the same time for a world that privileges critical and reflective skills related to collaboration, cooperation, problem solving, systems thinking, and technological literacies.

NOTES

1. I wish to thank my students in my course, "Education and Global Citizenship," offered through the Department of Communication at UCSD; especially Kyle Samia, for suggesting that in order to conceptualize an education that prepares global citizens it was necessary to shift into a new paradigm of thought.

2. For more information, see these organizations' websites: TASC of New York (http://www.tascorp.org/); the 21st CCLC (http://www.ed.gov/programs/21stcclc/

index.html); the ESS initiative (http://www.education.ky.gov/KDE/Instructional+Resources/Student+and+Family+Support/Extended+School+Services); and SFBI (http://www.sfbeacon.org/).

3. The other two quarters focus on the ways that gender, language, and culture intersect with access to educational resources, particularly for language minority youth.

4. At least one academic quarter a year for the last 15 years, undergraduates enrolled in the "Practicum in Child Development" course offered through the Department of Communication and Human Development Program at UCSD focus their ethnographic studies on the intersection of technology and learning and development at after-school computer-based field sites where they serve as collaborators with children from Mexican origin and American Indian communities.

5. The school bought the math version of SuccessMaker and cycled grades 1–3 through it during the sessions that had been arranged for the *La Clase Mágica* activity.

6. For 3 years, *La Clase Mágica* and the Neighborhood House Corporation (NHC) shared blind STAR scores of children attending both *La Clase Mágica* and the local Head Start Program that NHC oversaw. The two schools also shared blind scores of the STAR scores of participants and nonparticipants for within and across school comparisons.

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