



## ZIP CODES

**A partnership between the Camino Nuevo High School, the UCLA Center for Statistical Computing, and Daly Genik Architects**

### Background

Almost every aspect of our daily lives is “rendered” in data. New data collection technologies have made it easy to record continuous, high-resolution measurements of our physical environment (weather patterns, seismic events, the human genome). We are also constantly monitoring our movements through and interactions with our physical surroundings (automobile and air traffic, large-scale land use, advanced manufacturing facilities). In computer-mediated settings, our activities either depend crucially on or consist entirely of complex digital data (networked games, peer-to-peer technologies, Web site and Internet usage).

As a result of our improved abilities to “observe,” professional and research practices are becoming increasingly dependent on data and data processing, on drawing conclusions from or in some way adapting to rich flows of measurements taken from the physical or virtual worlds. These professional demands have given rise to a host of new analysis tools, new methodologies and new software, for uncovering significant structures in data.

While many of these advances were initiated in industrial or academic settings, we are starting to see the (inevitable?) migration of these technologies from labs and specialized deployments into widespread usage by the general public. The most obvious case in point is the trajectory followed by Geographic Information Systems; powerful mapping and overlay tools are available in a variety of convenient platforms and have been quickly taken up by non-specialists and applied effectively for social, political and cultural ends. The same can be said for database technology, with new Web sites

and services like Dabble DB and Swivel offering powerful, exceedingly user-friendly tools for storing, manipulating, and importantly, sharing data; or Many Eyes, a site that offers a kind of “social data analysis” by making relatively sophisticated graphical tools easily available, and applying a social network model to encourage interaction around the displays.

We should emphasize that this migration is not purely a “server-side” phenomenon, impacting storage and analysis tools. Powerful observation technologies, data collection platforms, are already in the hands (and pockets) of millions of Americans. The mobile phone network represents a sensing system with billions of “nodes” globally, capable of capturing text, audio, images and video. Mobile phone manufacturers are busy extending the capabilities of these devices, extending their sensing capabilities. In parallel, the advances in academic sensor network research will soon provide a range of affordable, easy-to-use, low power observing systems to the public.

### Scope of work

ZIP CODES is a joint project of the Camino Nuevo High School in Los Angeles, the UCLA Center for Statistical Computing, and Daly Genik Architects. In form, it is a public information display, a second skin that stretches across the west-facing façade of the high school itself, overlooking the intersection of Beverly and Vermont Boulevards. In function, it is a series of special courses and educational experiences that will help students navigate the shifting terrain of new information technologies. As these new technologies blur the lines between professional and non-professional “practices,” and as data networks continually jump personal boundaries, entangling physical “lived” space and virtual realms of communication and data processing, students need more than traditional “functional” training with new software or hardware. Instead, ZIP CODES will focus on the scientific, social and cultural implications of these technologies, providing students with critical reasoning skills and giving them access to these technologies on a day-to-day basis.



The title ZIP CODES is only loosely related to geography, and has very little to do with the U.S. Postal service. Rather, it represents a unique opportunity to create a public outlet for our curricular innovations. ZIP comes from the so-called zipper news displays that first appeared in the 1920s in Times Square, and CODE represents all the ways in which our physical “lived” spaces are translated into digital information, communicated and shared.

The project’s outward face is a large text display (three lines of 13 characters or one set of double high characters and a second line of 13 small characters) that will carry content that is curated, initially, in collaboration between UCLA students and faculty (Statistics, Computer Science, Engineering and Information Studies students participating in a graduate seminar) and faculty at the Camino Nuevo High School. The content will arise as part of a larger curricular effort incorporating both functional (skills-based) and critical training in data and information technologies, with the goal of placing these tools in larger social context. We see at least three categories of course activities that can channel content into ZIP CODES.

**Numeracy.** In some sense, the story of Camino Nuevo High School can be told most compellingly in numbers. The Census Bureau describes the community as having a high proportion of immigrants, low educational and literacy levels and high unemployment rates. The greater MacArthur Park area is severely overcrowded, with the greatest concentration of single parent households, the highest non-fluency in English and the lowest availability of automobiles. The median household income is low, and the poverty rate is high. For better or for worse, quantification, the creation of numerical reductions such as these, has become a fundamental part of how we understand the environmental and social processes taking place around us. Recognizing that this is, indeed, a reduction and the implications of that (what counts, counts) is an important first step in quantitative literacy. Through an elective course taught in collaboration with Camino Nuevo High School, students will examine fundamental statistical concepts, including basic data collection strategies, visualization and analysis, and policy making with data.

**Documentation.** Camino Nuevo High School is a hub of educational and social activity. Through ZIP CODES, the school has an opportunity to present that activity to the wider community. Much of the students’ work exists in digital formats already; during their time at Camino Nuevo, students maintain digital portfolios of their schoolwork. We envision the presentation of material from courses and events serving a journalistic purpose. ZIP CODES, however, will never serve as a simple calendar of events, endlessly looping. Rather, our goal is to create displays that are both visually compelling as well as content-rich. For this, we will introduce an elective course through Camino Nuevo’s art program, leveraging the experience of the project’s partners in information visualization. As an aside, the partners in this collaboration have deliberately chosen a text display for this project, rather than a large video billboard. The “narrow channel” of three lines and thirteen characters will force students to focus on very specific forms of storytelling (this restriction also makes it possible to foresee completely student driven programming).

**Advocacy.** Perhaps the strongest justification for ZIP CODES comes from its role in student-led advocacy. Camino Nuevo High School prepares its students to be “social agents for change.” The information technologies alluded to in the Background section are rapidly becoming tools for advocacy. Groups like Tactical Tech and Mobile Active are quickly reimagining the mobile phone network as a platform for case-making. Through an elective course that combines statistics, art and information studies, students will organize data collection “campaigns” related to issues facing the larger community. The ZIP CODE text display will then function as an organ for public advocacy. Again, the restriction to text alone implies a particular kind of presentation that “reads” well on the scale of a building.

Through these three curricular activities, the presence of the ZIP CODES text display becomes more than a curiosity, but rather a motivator and venue for innovative educational experiences.

## **B. Building Capacity.**

Separately, the three partners in this project have extensive experience in the design and deployment of public displays; in research and pedagogical innovation related to both the technical aspects and the social implications of data collection and analysis; and the development of a service-learning curriculum for high school students. The combination of these forces, while somewhat unlikely, has led to the novel program outlined above. The bold gesture represented by ZIP CODES has had and will continue to have reverberations throughout the school and out into the community. To help guide this project as it develops, several UCLA institutions will be consulted. The head of the Center for Statistical Computing is also a Co-PI on the NSF Science and Technology Center CENS (The Center for Embedded Networked Sensing) which has its own K-12 program that can serve an informal advisory role. The Statistics Department at UCLA has its own Center for Statistics Education which will also provide valuable insights as the project moves forward.

## **C. Sustainability.**

ZIP CODES has the potential to remain an on-going educational resource for Camino Nuevo and the surrounding community well after the grant funds conclude. In particular, the installation of the display infrastructure and computer network will remain unchanged and continue to be used by students and their instructors to ensure an ongoing learning process. We do not want this to be limited to one class of students. Each successive year will be able to learn the concepts and skills that overlap in the realms of art, media and data exploration and advance their knowledge of these intertwined disciplines.

Teachers at the school will lead each class and teach the necessary programming skills but, more importantly, they will be demonstrating how this multi-media project can adapt as students develop creative ways of interacting with the media output.

Funds for teachers will still be necessary and will be covered by Camino Nuevo in order to continue the work. UCLA graduate students will be welcome to continue their mentoring work with the students but stipend/salary funds will end with this grant.

## **D. Evaluation**

Evaluation, much like the curriculum itself, can operate on two levels. The first is functional. ZIP CODES will produce an open source software interface to the sign itself. Basic requirements related to its refresh rate data handling capabilities form the first line of evaluation. Daly Genik and members from the Center for Statistical Computing will take most of the responsibility for this aspect of the project. A second level of evaluation concerns the effectiveness of the elective courses. For this, we will consult members from UCLA's Graduate School of Education and Information Sciences. Finally, the students themselves will be producing and documenting their activities in the class for evaluation by their peers.

## **E. Dissemination**

The Zip Codes project will be consistently available to the public and future researchers after its installation on the front of the school. Media and data streams are proposed to continue with each successive class of students. In addition, the display will be recorded from a fixed position across the street in order to evaluate the data being displayed, observe the public's interest, and to maintain a record of what the students produced.

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## **F. Background on Camino Nuevo Charter Academy**

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Camino Nuevo Charter Academy (CNCA) was founded in 2000 through the efforts of a local community development corporation, Pueblo Nuevo Development, to address extremely overcrowded and underperforming local schools in the Greater MacArthur Park area, just west of downtown Los Angeles. The goal of CNCA has been to bring quality educational choices to parent and students, to improve the quality of life for its students through a solid educational foundation, and to strive for positive change in the ecology of the neighborhood through its impact on students, families and the community. CNCA brings to its community a distinct, place-based approach to achieve its mission.

Since 2000, CNCA has provided high quality education to students in the Greater MacArthur Park and Mid-Wilshire communities. During the last seven years, CNCA has grown organically and opportunistically. Now, CNCA is undertaking an evolution into an organization providing a seamless educational trajectory with four campuses and over 1,500 students in pre-school through high school.

To accomplish our mission CNCA has created a comprehensive educational program, including a rigorous academic curriculum focused on play-based and project-based learning, integration of the visual and performing arts, an emphasis on environmental education, access to the latest information technology, after school enrichment programs at each campus, and extensive parent and community outreach.

The underlying philosophy of CNCA is that when underserved students are provided equal access to rigorous, researched-based educational programs in which families are an integral component, children gain the tools to achieve academic success as early as kindergarten. CNCA has demonstrated solid academic results, outperforming schools serving the same community, as well as Los Angeles Unified School District (LAUSD) averages. Among CNCA's unique qualities are high expectations, a college preparatory focus, project-based learning and use of technology, an extended school year and a strong professional development program for teachers.