

Technological trends, transformations, and new learning models: The San Francisco Bay Area case

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Abstract

While it is true that technological, economic, and social trends also extend their influence on educational and learning models, it is also true that in certain areas of the world, where the vanguards are at home, this is more the case.

The case reported concerns the San Francisco Bay Area, an area that holds within it Silicon Valley, with over thirty world-leading technology companies and the best start-ups in the world.

It is an area where education does not take second place and where research also commits a large part of government and private entrepreneurs' profits. In the San Francisco Bay Area, development passes through a new idea of education.

Key words: trends; technology, learning, transformations, San Francisco.

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1. Introduction

The rapidity of the changes and transformations in today's reality, even more so when we refer to the technological landscape that now inhabits everyone's life, are also the subject of attention from a pedagogical and social point of view. The person, in fact, nowadays spends an important part of his or her existence in contact with technology, lives *onlife* (Floridi, 2014), is in continuous confrontation – and this is the subject of this essay – with the most recent technological trends that follow one another, chase after one another and contribute to the definition of new social and, no less, educational models. In other words, the direction of the new trends has a path almost identical to that of the same educational models that, not infrequently, it defines and outlines.

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This is even more so where avant-garde trends set the standard, as in California and the San Francisco Bay Area.

2. Where, how and why it all starts in California

When we talk about California, we are certainly talking about one of the most advanced states in the world, a thriving territory in every respect, a vanguard in terms of production, social and technological avant-garde; one of those that contribute the most to the U.S. maintaining its absolute leadership role in the world.

One article released in Italy in late 2022 (*California, una grande potenza*), published on *Italia Oggi*¹, raised the possibility of California overtaking Germany as the world's fourth largest economy (after the US, China and Japan). California is the most populous of the American states, with over 40 million inhabitants. Together, population and prosperity make the so-called Golden State the single most influential pool of electoral votes in the US. It is the leading state in the slow but steady shift of American decision-making centres from the East to the West Coast. With the sole exception of Donald Trump, the US has not had a New York president since Franklin Roosevelt, whose predecessor, Hoover, was himself a Californian. Meanwhile, California sent Richard Nixon and Ronald Reagan to Washington. But it is not all positive: high local taxes, rampant crime, droughts, swarms of homeless people on the streets and the spectacular inefficiencies of its state bureaucracy, as well as the remarkable eccentricity of its political processes, have prompted many a businessman, most recently Elon Musk, to seek other shores. Despite these warnings, California has embodied the American dream for too long for it to wither away quickly. Above all, it is the American gateway to Asia, across the Pacific, now the focal point of US economic and strategic attention.

In 2019, California generated a gross domestic product of \$3.2 trillion, almost double that of Italy, making it the world's leading sub-national economy. If it were a nation, California would be the fifth largest economy in the world after the United States, China, Japan and Germany. About 20% of the total US GDP is produced in California. Certain areas or regions of the state are also strongly identified with a type of product, such as Hollywood (film, television), the Central Valley of California (agriculture), Silicon Valley (high technology), as well as the wine regions in the northern part of the state. Specifically, technology, the leap forward in technology represents one of the most pronounced characterisations of California.

¹ *Italia Oggi*, n. 279 del 26.11.2022, p. 13.

The new and important video game industry – which also refers from a pedagogical point of view to the broad topic of Serious Games – is in any case concentrated there and is bigger, internationally, than the two industries of film and music put together. California, for many Americans (and not only) has long represented the future in some way, and it is from this that we want to start talking about influential trends.

3. San Francisco Bay Area model

This is the city, or rather the area (the San Francisco Bay Area) that more than any other embodies the libertarian and ecologist soul not only of the States but also worldwide; the ultimate expression of a cultural and social avant-garde, a carefree but hospitable atmosphere, far from the usual frenetic rhythms of the metropolis. «*One day, if I go to heaven, I will look around and say: not bad, but it's not San Francisco*», wrote the journalist Herb Caen². And it is not hard to see why. Between hippies and techies, the city of the Golden Gate and Silicon Valley sees small entrepreneurs, artists and designers challenging capitalism daily in the name of individuality and a less creative lifestyle.

In this cradle, the avant-garde, new models find fertile ground. Just think of the communication revolution that came out of the Mental Research Institute (MRI) located in Palo Alto, a city in Silicon Valley known for electronics and now also for information technology (home to Hewlett Packard, Facebook, LinkedIn and other new economy companies). The institute (the MRI) gave birth to the so-called Palo Alto School, dedicated to communication, of which Paul Watzlawik was the most prominent exponent. At the MRI, mental problems were studied in their communicational aspects, but the relationships between healthy people were also investigated, defining the basic principles of communication. This gave rise to the five axioms of communication, which Watzlawik encapsulated in his famous 1967 volume *Pragmatics of Human Communication. A Study of Interactional Patterns, Pathologies, and Paradoxes*. The first axiom, *one cannot, not communicate*, represented a revolution of worldwide scope that influenced, modified, and changed every style and model of communication. But this is only one example, to which we could add the Beat Generation, a movement that started in America's cultural capital.

² Herbert Eugene Caen (April 3, 1916 – February 1, 1997) was a San Francisco humorist and journalist whose daily column of local goings-on and insider gossip, social and political happenings, and offbeat puns and anecdotes – “A continuous love letter to San Francisco” – appeared in the San Francisco Chronicle for almost sixty years and made him a household name throughout the San Francisco Bay Area.

4. Technological trends and new learning models

4.1. *New policies, new models*

The very new technological vanguards that are emerging in the San Francisco, California area are relevant from an educational point of view, since they both start from the same point. The novelties, the progress, that is trendsetting on the technological front, is the child of choices, mainly political-economic, that have in fact also incredibly altered the training of young people, the in-progress training of workers and the work itself.

It all starts with a choice: *funding research and development in the Bay Area*. This commitment is subdivided into several axes that over the last twenty years have greatly influenced the training models and continue to do so by transforming and calibrating them to the real work needs of that particular area with a high index of technological development.

Industry Funding for University Research. In 2015, Californian companies funded \$95.574 billion in research and development, with the bulk of that support (\$95.020 billion) going to internal research. The remaining \$554 million of that industry funding went to research conducted at California universities. This is a relatively small amount (6.3% of all higher education research and development), but it is an important indicator.

Federal Funding. While fifteen federal departments and a dozen other federal agencies provide funding for research and development, eight federal departments or agencies provide the preponderance, with each obligating more than \$1 billion annually: Department of Defense (DOD), Department of Health and Human Services (HHS), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), Department of Agriculture (USDA), Department of Homeland Security (DHS), and Department of Commerce (DOC). Taken together, they accounted for about 97 percent of the federal R&D and R&D plant funding. California and the Bay Area are major beneficiaries of this investment.

Research Universities. Funding from the federal government accounts for about half of all research and development spending by California's higher education institutions. The Bay Area's extensive higher education network includes five major research universities:

1. Stanford University, which is one of the 10 US universities with annual research and development expenditure totals exceeding \$1 billion.

2. UC San Francisco also has total annual research and development expenditure in excess of \$1 billion.
3. UC Berkeley has a total research and development expenditure of about three quarters of a billion dollars.
4. UC Davis had a total research and development expenditure of just under three quarters of a billion dollars.
5. UC Santa Cruz's research and development expenditure has been less than \$200 million per year for the past ten years.

Together, these five universities account for just over \$2 billion in research and development spending from federal funds, nearly 50 per cent of federal research and development funding received by higher education institutions in California.

National Laboratories and Federal Research Facilities. The Bay Area is also home to numerous federal research facilities, federally funded research, and development centers (FFRDCs), and national laboratories.

- A federal research laboratory is a facility funded and managed by a specific federal agency. Among the federal research laboratories in the Bay Area are the USDA's Western Regional Research Center in Albany, the EPA's Central Regional Laboratory in Richmond, and the FDA's San Francisco Laboratory in Alameda.
- FFRDCs are federal research institutions funded by an agency or department and managed by a third-party entity.
- The term national laboratories refers specifically to DOE's 17 facilities nationwide that conduct research and development in areas related to energy and technology. Sixteen of the national laboratories are FFRDCs and one is both government owned and operated.

State Funding. In the United States, state government research and development spending is considerable. Five states – California, New York, Texas, Florida, and Ohio – have accounted for over 60% of all state government research and development in recent years. California leads the nation with the highest amount of state government R&D expenditures overall and with the highest amounts distributed to each of the two R&D performer categories – i.e., intramural performers, defined as employees within the same state department or agency and services performed by others in support of internal projects, and extramural performers, defined as academic institutions, companies, and individuals, and other non-intramural performers.

Philanthropic Funding. Philanthropic private funding plays a small but significant role in the R&D process, particularly in support of basic research.

While private funding cannot provide levels of research support comparable to those supplied by the federal or state governments, it nonetheless plays an important role in advancing research in niche areas. Private funders often have more freedom in making research funding decisions, allowing them to fund scientifically uncertain projects, with government supporting the research once more scientific certainty emerges.

Funding for Startups. As a rule, research and development funding does not support the activities required to take innovative research out of the lab and into new products and companies. That comes primarily from private industry, in the form of angel and venture investment, and from federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants that pick up where traditional research funding stops.

4.2. Education and learning

The state has increased the number of schools and after-school programmes offering training in 21st century skills (e.g. computer science, computational thinking, maker-centred learning, human-centred design). More and more technology companies are encouraging their employees, where possible with paid leave, to tutor teachers and students on these skills and to collaborate with local universities to develop technical skills.

Technology companies are already finding creative ways to invest in K–14 and lifelong learning programs that grow the technical workforce and bring more Californians into the 21st century economy. Oracle’s support for the Design Tech High School (d.tech) offers one example.

A pioneering California public charter school, d.tech focuses on student learning through a combination of academics, technological skills development, and real- world problem solving using a design thinking approach similar to that taught at Stanford University’s Hasso Plattner Institute of Design. In 2018, d.tech moved into a new \$43 million building specially created for the school by Oracle on its Redwood Shores campus. The new facility includes a two-story maker space designated as the Design Realization Garage. Special resources available to students include 2-week “intersessions” held four times a year during which the Oracle Education Foundation and other non-profits offer special skill- building courses in areas such as coding, user-centered design, and financial literacy. Outside the regular curriculum, d.tech students will lead summer workshops on design thinking that are open to elementary and middle school students. Oracle’s novel support model offers an excellent example of the kind of innovative contributions that motivated

technology companies can make to skills development and to the educational foundation on which innovation in the Bay Area and California relies.

Another example is P-TECH (Pathways in Technology Early College High), a national and global extended high school (grades 9-14) public education redesign model linking education with workforce development. The P-TECH partnership combines the expertise of public and private systems and institutions – school districts, community colleges, and industry – with high-level government support. When students graduate, they have earned both their high school diploma and an associate degree that is directly aligned with industry needs.

5. Conclusions

The new training alphabets take shape, therefore, thanks to the contribution of the world of work, but the lesson is probably this: areas of significant productive development, especially where a high level of training is required, can turn the table. So, it is the demand for labour that strongly influences training, its models and quality standards and not the other way around, i.e. training that qualifies labour. Obviously not in words but by investing. A trend, a vanguard that could in time change, as is already happening in the metropolises of Asia, other specific production areas of the globe.

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