

MORGRIDGE-i-zation of MOLECULAR VIROLOGY

WHY NOT ?

In the 21st century post-pandemic era, lessons from a 20th century networking academy may offer vital clues.

It is always about leadership. Isn't it?

Almost thirty-years ago, John Morgridge¹ had the incisive foresight to observe that *Being Digital*² in the post-WWW³ era will require technologically-literate human capital to build the necessary digital infrastructure to better integrate digital transformation in our daily lives, if it offers value.

During 1993-1994, the birth of the Cisco Networking Academy in a San Francisco high school and other locations, were the outcome of a few brilliant high school teachers in collaboration with Cisco. Demystifying network communications and successfully making it a high school course (project) may be comparable to lectures in kinetic theory which were taught in elite universities in the 1960's but are now a staple in secondary school science⁴ classrooms. The latter was catalyzed by Glenn Seaborg⁵ and others⁶.

Literacy, invention, knowledge and the economy (LIKE), whether we like it or not, are linked, inextricably. We cannot have one without the other. Building bridges on these pillars are quintessential for our civilization to proceed on its journey into the future. The pandemic in progress has demonstrated without a shadow of a doubt that literacy and knowledge are the ammunition to fight ignorance and the malicious diffusion of misinformation which has precipitated immense morbidity and mortality.

Morgridge-i-zation of molecular virology is a clarion call for a nation which is at risk, *again*. If we do not want to meet with *The Fate of Rome*⁷ then we must expeditiously find a plethora of ways to usher mass literacy of molecular virology through secondary school curriculum, classrooms and communities. Knowledge and information arbitrage begins by supporting teachers and Science Education Partnerships of the type pioneered by Bruce Alberts⁸ in 1987 as well as Teacher's Institutes (for example, at MIT⁹) and giant steps by Carol Christ¹⁰ in 1996 which helped the community¹¹ by creating the Berkeley¹² Pledge¹³.

1 - Notes of an obstreperous raconteur. ("The farther back you can look, the farther forward you are likely to see.")

"There is a real need for people to master technology, and the Cisco Networking Academy Program is a superb vehicle to help satisfy that. It is changing people's lives and preparing students of all ages for the new economy that is upon us."

John Morgridge
Chairman of Board of Directors
Cisco Systems, Inc.

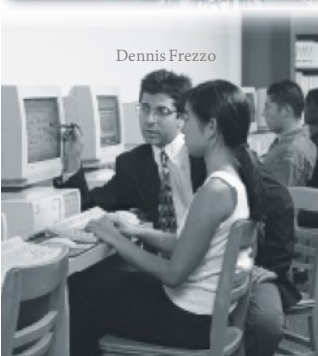


Close-Up: Thurgood Marshall Academic
High School Section

San Francisco, California

Thurgood Marshall Academic High School (TMAHS) was established in 1994 in the economically underdeveloped southeast corner of San Francisco. Focusing on a math, science, and engineering curriculum, the school gives students a rigorous course of academic study with an abundance of college-prep math, science, and English classes, plus three semesters of computer and technology electives.

The Cisco Networking Academies curriculum has been integrated into one of three areas for concentrated study selected by all TMAHS students after they reach their junior year. Juniors take Cisco I and II, and seniors complete the program with Cisco III and IV, supplemented by projects and courses in related engineering disciplines. "This is above and beyond what we normally do, but we thought this was an incredible opportunity for the kids," says Frezzo.



Dennis Frezzo

In 1993, Cisco embarked on an initiative to design practical, cost-effective networks for schools. It quickly became apparent that designing and installing the networks was not enough—the schools also needed some way to maintain the networks after they were up and running. Cisco Senior Consulting Engineer George Ward developed training for teachers and staff for maintenance of school networks. He soon discovered that the personnel lacked the time required to learn the material, so he moved to the next population of learners in the school—the students themselves. The success of these student seminars led to requests from participating schools across the country for Cisco to develop a curriculum that could be integrated as elective courses taught in a semester format. The formalized curriculum and support activities evolved into the Cisco Networking Academies program.



Tashia's Husband



George Ward



Kevin Warner



DOES MOLECULAR VIROLOGY NEED THE MORGRIDGE WAY?

With abundance of online material and the pervasive zoom culture, it is not difficult to train teachers in molecular virology using digital tools¹⁴ and treasure chests like MIT OpenCourseware¹⁵ which also serves high school¹⁶ students. This could be a key role for the NSTA¹⁷. Financial support for teachers is an essential incentive. Foundations may want to invest in hard sciences capacity building which may tune the engine rather than touchy-feely efforts to polish the chrome for marketing and PR.

Partnerships will be critical to assist teachers to engage students in hands-on lab experiments. Understanding "by doing" is a complex series of orchestrations. It may be the glue to pave the way to attain a level of scientific literacy necessary for the next generation to make data-informed choices. Yeast, *Drosophila*, Plants (*Arabidopsis*) and basic biotech tools (DNA extraction, DNA fingerprinting) are not uncommon in biology labs in schools. At least for the US, how difficult can it be to add basic virology lessons such as lysogeny? Resistance¹⁸ (immunity) to phages lead us to CRISPR¹⁹.

Ultimately, it is about leadership and the will to change the equation over time, over decades.

Most individuals mentioned in this note are alive and well. Eric Lander²⁰ is nearer to the helm. J. Larry Jameson²¹ may be a superman. Anne Klibanski²² is "health" personified. Atul Gawande²³ offers us the age-less wisdom of aging, illness, and dying. Kizzmekia Corbett²⁴ is making very sure there will be *No Time To Die*²⁵ from pesky viruses. Are we still waiting for Godot²⁶ at the corner of East Tasman Way and Morgridge Way?

¹ <https://scripophily.net/cisyincca19.html>

² Negroponte, Nicholas. *Being Digital*. 1st edition, 1995. Knopf Doubleday Publishing Group, 1995. ISBN 10: 0679439196 ISBN 13: 9780679439196

³ Short History of the Web. CERN, <https://home.cern/science/computing/birth-web/short-history-web>

⁴ *Science Content Standards for California Public Schools: Kindergarten through Grade Twelve*.
<https://www.cde.ca.gov/be/st/ss/documents/sciencetnd.pdf>

⁵ Seaborg, Glenn T. et al (1983) *A Nation at Risk: The Imperative for Educational Reform*.
https://edreform.com/wp-content/uploads/2013/02/A_Nation_At_Risk_1983.pdf

⁶ Lehrman, Sally. “Nobel Laureates in Bid to Revamp Science Teaching.” *Nature*, volume 391, no. 6663, January 8, 1998, pp. 113–113. <https://doi.org/10.1038/34255>

⁷ Harper, Kyle. *Fate of Rome: Climate, Disease, and End of an Empire*. Princeton University Press, 2017.

⁸ Alberts, Bruce M. and Sussman, Art (1993) *Science Education Partnerships: Manual for Scientists and K-12 Teachers*. University of California, San Francisco, 3rd Ave & Parnassus St, San Francisco, CA 94143. ISBN 0-9635683-1-0 <https://sep.ucsf.edu/what-we-do/>

⁹ *Teaching Teachers: Whitehead Institute Program Bridges the Gap Between the Lab and the Classroom*.
<https://wi.mit.edu/news/teaching-teachers-whitehead-institute-program-bridges-gap-between-lab-and-classroom>
and <https://wi.mit.edu/program/seminar-series-high-school-teachers>

¹⁰ Carol Tecla Christ, Office of the Chancellor, University of California, Berkeley.
<https://chancellor.berkeley.edu/chancellor-christ/biography>

¹¹ Advancing the Pledge (Feb 28, 1996) www.berkeley.edu/news/berkeleyan/1996/0228/pledge.html

¹² Asimov, Nanette (1995) *UC Berkeley Is Taking The ‘Pledge’ - An alternative to affirmative action*. The San Francisco Chronicle (Dec 25, 1995) <https://www.sfchronicle.com/author/nanette-asimov/>

¹³ Diaz, John (1996) *Tien’s Alternative to Affirmative Action*. **Editorial**. Jan 2, 1996. The San Francisco Chronicle. Copy of the Editorial in the MIT Library <https://bit.ly/EDITORIAL-1996-Chancellor-Tien>

¹⁴ <https://openlearning.mit.edu/>

¹⁵ <https://ocw.mit.edu/>

¹⁶ <https://ocw.mit.edu/high-school/biology/>

¹⁷ <https://www.nsta.org/>

¹⁸ Labrie SJ, Samson JE, Moineau S. *Bacteriophage resistance mechanisms*. *Nature Review Microbiology*. 2010 May; 8 (5):317-27. doi: 10.1038/nrmicro2315. Epub 2010 March 29. www.nature.com/articles/nrmicro2315

¹⁹ Barrangou R, Marraffini LA. *CRISPR-Cas systems: Prokaryotes upgrade to adaptive immunity*. *Molecular Cell* 2014 Apr 24; 54(2): 234-244 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4025954/pdf/nihms576753.pdf>

²⁰ <https://biology.mit.edu/profile/eric-s-lander/>

²¹ <https://www.med.upenn.edu/evpdean/jameson.html>

²² <https://www.massgeneralbrigham.org/how-we-lead/leadership/anne-klibanski-biography>

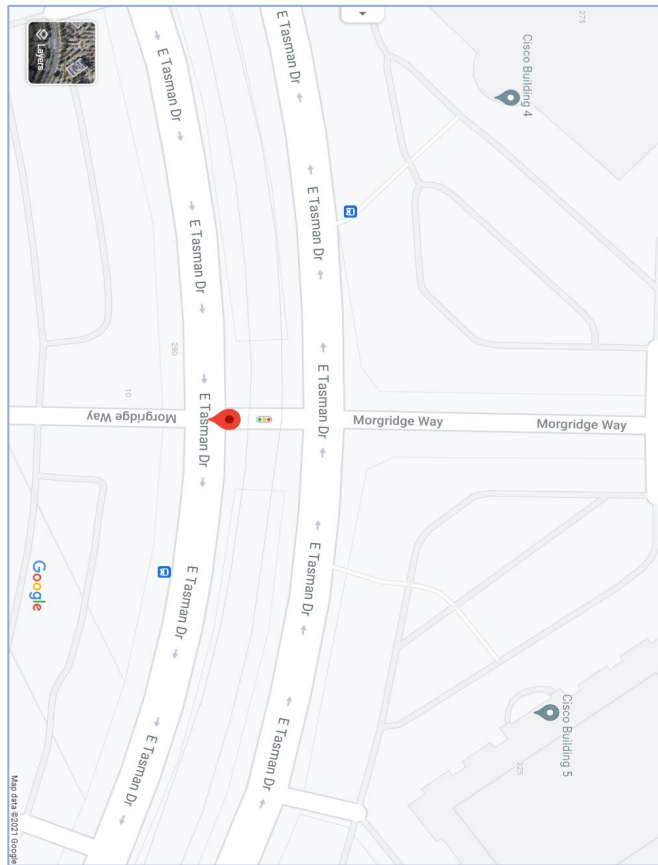
²³ <https://www.hsph.harvard.edu/atul-gawande/>

²⁴ <https://www.hsph.harvard.edu/news/press-releases/kizzmekia-corbett-joins-harvard-chan-school/>

²⁵ <https://www.imdb.com/title/tt2382320/>

²⁶ Beckett, Samuel (1952) *En attendant Godot* (French) (*Waiting for Godot*. Translated by Samuel Beckett, 1954)
<https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2011/01/Waiting-for-Godot.pdf>

MORGRIDGE WAY, SAN JOSE, CALIFORNIA 95134



Behind every good man there is a great woman.

4 - Notes of an obstreperous raconteur. ("The farther back you can look, the farther forward you are likely to see.")