MINUTES OF THE FORTY-FIFTH SENATE
OF THE ACADEMIC COUNCIL
March 7, 2013

I. Call to Order
The Chair of the 45th Senate, Ray Levitt, called the fourth meeting of Winter Quarter to order at 3:20 PM.

In attendance were 30 members, 7 ex officio members and many guests.

Chair Levitt opened the session. “Welcome, everyone.

“As a reminder, prior to this meeting, the Steering Committee met on behalf of the Senate to hear nine items from two Academic Council Committees, the Committee on Graduate Studies and the Committee on the Review of Undergraduate Majors. These items did not require the attention of the full Senate. All senators received the agenda for that session in their Senate packets and were welcome to attend. The documents for that meeting are available on the Faculty Senate website or through the Academic Secretary’s Office, and a report of the actions taken in that session will be included with the minutes of today’s meeting and will appear in the link in the online Stanford Report next week and on the Faculty Senate website.”

II. Approval of Minutes – (SenD#6722)
The minutes of the February 21, 2013, meeting of Senate XLV were approved.

III. Action Calendar:
There were no items on the Action Calendar.

IV. Standing Reports
A. Memorial Resolutions:
Chair Levitt welcomed Jim Gibbons, Professor (Research) of Electrical Engineering, to present a brief memorial statement in honor of John Linvill, the Canon USA Professor of Engineering, Emeritus. The full-length memorial resolution was included in the packets (SenD#6729) and will be linked to in the Stanford Report. In attendance today is Professor Robert Dutton, member of the Memorial Resolution committee, Professor Linvill’s daughter Candace, and son-in-law, Chris.
John Linvill (1919-2011) SenD#6729

John Linvill, professor emeritus of electrical engineering at Stanford, died at age 91 on Feb. 19, 2011. He was a revered figure at Stanford, as much for his unpretentious style and steadfast mentorship of others, as for his engineering foresight and commitment to the entrepreneurial spirit. He repeatedly exhibited an intuitive understanding of transformative moments, was able to imagine their potential importance and to innovate an action plan for Stanford. Linvill chaired the Department of Electrical Engineering (EE) from 1964 to 1980 and was a leading figure in the School of Engineering during the 1960s and ’70s, a seminal period in the development of Silicon Valley. He was associate dean of the School of Engineering from 1972 to 1980, and was the Canon USA Professor of Electrical Engineering from its endowment in 1989 until his retirement in 1990.

Born in Kansas City, MO on August 8, 1919, Linvill grew up on a 900-acre farm near Polo, MO. He attended William Jewel College in Liberty, MO where he received a bachelor’s degree in mathematics in 1941. He then attended MIT, where he earned his bachelor’s (1944), master’s (1946) and doctoral degrees (1949), all in electrical engineering. After two years as an Assistant Professor at MIT, he joined the (AT&T) Bell Laboratories, where he did circuit research using the bipolar transistor.

Dean Frederick Terman recruited Linvill to come to Stanford in 1954 to build a program in the application of transistors. He began by creating Stanford’s first course on the subject. Then, working with Terman and William Shockley (co-inventor of the transistor), he developed a research and teaching plan for Stanford to help build the electronics industry in what would become Silicon Valley. The starting point was a laboratory capable of building semiconductor devices on campus - a truly revolutionary educational step.

With the completion of this laboratory, Linvill recruited distinguished researchers from industry, as faculty, with world-class credentials. As research moved from transistor applications in the 1960-70s to the microprocessor era in the 1980s, Linvill continued to build the department with strategic hires. He was a key driving force in creating the Center for Integrated Systems (CIS)—one of the first university-industry consortia, targeted at leveraging the computational power of integrated systems.

His skill in faculty hiring and his mentorship of young faculty created a department of Electrical Engineering that provided 40 years of leadership to the field, while also providing senior leadership to the University itself. The hiring of faculty who became Stanford’s three most recent Deans of Engineering, one of whom is now our President, is a lasting part of Linvill’s legacy.

Linvill also applied his engineering creativity and entrepreneurial spirit for benefit to society. John and Marjorie’s daughter, Candace, became blind in infancy. Linvill sought to help her to directly read printed materials without translation into Braille.
He leveraged the power of integrated circuits to create the Optacon (Optical-to-Tactile Converter), a portable, hand-held camera device, that could be moved across a line of printed material to generate images on a fingertip-sized tactile display.

Linvill was a fellow of the IEEE and a member of the National Academy of Engineering and the American Academy of Arts and Sciences. He received the IEEE Education Medal in 1976 and the John Scott Award for his work on the Optacon.

He is survived by his wife, Marjorie Linvill, a son, Greg (Betty), a daughter, Candace Berg (Chris), and their children. His twin brother William, also a Stanford professor, died in 1980.

Mr. Chairman, I have the honor, on behalf of a committee consisting of Professor Robert Dutton, Andrew Myers, and myself, James F. Gibbons, Professor of Electrical Engineering, to lay before the Senate of the Academic Council a Resolution in the memory of the late John Linvill, Professor Emeritus of Electrical Engineering in the School of Engineering.

At Chair Levitt’s invitation, everyone stood for a moment of silence in tribute.

Chair Levitt thanked Professors Gibbons, Dutton and graduate student Andrew Myers.

A. Steering Committee
Chair Levitt turned to the Steering Committee announcements.

“First, a note about today’s agenda: we have agreed to slow down the discussion on class schedules to address more thoroughly the concerns that have surfaced about the proposed changes. This item has been tentatively moved to the May 2 agenda. This will give C-USP and C-GS adequate time to review and comment on the proposal; and we will plan to implement the schedule and registration changes, if approved by the Senate, in the 2014-15 academic year, rather than in 2013-14, in order to give departments more time to react to the changes and plan accordingly.”

Senate members were reminded that that there is no April meeting—the annual Academic Council Meeting, convened by President Hennessy, will take place on April 18th in place of the regular Senate meeting. The location will be announced shortly.

May 2: The Board of Judicial Affairs will present revisions to the Alternative Review Process.

May 16: Professor Russell Berman will lead a panel discussion on the future of the PhD degree with perspectives from across the university. Following the regular meeting, the Senate will convene in an Executive Session.
Chair Levitt called attention to a very important reminder: Online elections for the Senate and the first round of Advisory Board elections were extended through March 8th. He urged everyone to vote and urge their colleagues to vote – faculty participation is the foundation of Stanford’s faculty governance system. Any questions or concerns can be answered by the Academic Secretary’s Office.

B. Committee on Committees (CoC)
   There was no report.

C. President
   President Hennessy had no report and there were no questions.

   Provost
   Provost Etchemendy was away.

V. Other Reports
A. Vice Provost for Graduate Education Annual Report
   Chair Levitt welcomed Vice Provost for Graduate Education Patti Gumport to present her annual report.

   She began her presentation with the aid of slides.

   “Good afternoon, everyone. Much of what we do in graduate education is local; we make decisions in our departments about who to admit, how to fund them, what our degree requirements are, how to do the research training, and when they’ve met our expectations to graduate. So we’re decentralized. This is an opportunity to reflect on the bigger picture, the challenges that we face as a university.”

   The Commission on Graduate Education report in 2005 for Graduate Education at Stanford stated:

   “Stanford is to be the place that attracts the best graduate students and provides them unparalleled education in preparation for their leadership roles in a complex, global society.”

   Slide:
   University Priority Areas
          1. Diversity
          2. Academic innovation in degree programs
          3. Interdisciplinary opportunities & networks
          4. Graduate professional development
          5. University-wide fellowships
          6. Graduate academic policy

   “This is the vision that’s guided our work over the last six years. The commission also wrote about the challenges and here are six that I thought really important.
“Formation of the office of VPGE was recommendation #18 in the report, that there be an office to take a university-wide perspective and help represent graduate education at the highest levels of decision-making.

“We are really decentralized. We have about 100 departments and programs in seven schools, and nearly 9,000 graduate students. Some of the challenges we face are exacerbated by our decentralized structure. So it’s important to create many forums to focus our intentions to address the challenges so we can improve the experience of our graduate students.”

VPGE Gumport listed 3 challenges she wished to talk about: Graduate Student Funding, Diversity and Career Paths.

She first described the magnitude of the graduate student enterprise. The graduate student population has grown from 6,646 in 1985 to 8,871 in 2012 while the undergraduate population has only increased from 6,593 to 6,999.

“People often presume that this growth is due to an increase in master’s degree students. That is not the case. We had an increase of 47% in master’s students. But we also had an increase of 37% in doctoral students and 12% in professional degree students.

“In 2012, 39% were enrolled in Engineering, 25% in Humanities and Sciences (H&S), 11% in the Graduate School of Business (GSB) and 10% in Medicine. By degree level, 52% were pursuing a doctoral degree, 28% a master’s degree and 20% a professional degree (MD, JD, MBA).

“In 2011-2012, 3,295 degrees were awarded.

“We have over 500 students identifying as ‘co-terms’ each year and there’s a collaborative effort underway to update some co-term policies.”

I. Graduate Student Funding

“I have noticed that many faculty members, as I did before I became Vice Provost, assume that the system of funding graduate students we have in our [own] department is the case in the whole university. Well, there is no single funding model.”

Slide: I. Graduate Student Funding

Major forms of support

- Research Assistantships
- Teaching Assistantships
- Fellowships
- Loans

Major sources

- Federal research grants & contracts; fellowships
• University & department funds
• Outside awards (e.g., foundations; corporations; other countries)
• Personal funds

PhD students: tuition & living expenses 6 years: $360K

“The median time to degree for PhD students is 5.75 years. The total cost of tuition and living expenses for that period of time for a student admitted this year will be about $360,000. This has increased from about $245,000 in 2003.”

“I benchmarked what’s happened in recent years against 1998. [The funding includes tuition, stipends and salaries, and health insurance.] We have three basic sources of funding: external grants and contracts, designated and restricted funds—this includes the University’s fellowship funds given out by the schools and also centrally, by my office—and general funds.

“There’s been a doubling of support, from FY98 to FY10 and that’s exceeded the pace of inflation (these charts are in absolute dollars).”

VPGE Gumport noted the changing mix of support. “In FY98, external grants and contracts was 39% of the total. And it was reduced to 27% of the total in FY11. It reduces the vulnerability of graduate student funding to fluctuations in outside sources.
“What accounts for that? The rise in designated and restricted funds [is] primarily fellowship funding: our deans, our faculty, our development office, have been hustling to increase our endowed fellowship support. I think what opened the door on that increase was the Stanford Graduate Fellows Program in Science and Engineering. Since 1997 when the SGF program was launched, we have funded over 2,000 PhD students and granted over 1,000 doctorates.”

VPGE Gumport showed that the funding by source varied widely among the different schools from 42% from external grants and contracts in Medicine to little or none in GSB and Law.

“You can see that proportionally, H&S does not have as large a proportional reliance on external grants as Medicine and Engineering, but it’s still a significant amount of funding [18%, $14.3M]. So we keep this in mind when we look at the school vulnerability.

“By agency, the National Science Foundation (NSF) (31%, $26.6M) and National Institutes of Health (NIH) (21%, $19.6M) are our largest sources, and overall, 84% of external grants & contracts ($71.3M) is from federal sources. In the context of sequestration, we’re paying very close attention, and as Dean Ann Arvin mentioned at the previous Senate session, we’re in a “wait and see” mode with regard to how these agencies will respond.

“At that session you were shown a worst-case scenario of an 8% cut. Now we’re working with the idea of a 5% cut, but either way we have confidence that this is manageable in the aggregate.

“I’m especially concerned about the impact of federal funding for doctoral students and postdocs. Forty percent of doctoral students are federally funded.”

Slide: Financial Responses to Cuts?
Stanford’s top priority is to meet our funding commitment to current graduate students.

The source of the funds may come from several levels:
• Principal Investigator/Faculty
• Department
• School
• Central Funds: Unrestricted, Endowed, & General Funds

“I want to reassure our graduate students and the faculty that our top priority is to meet our current funding commitment to our students.
“The issue is where will the funds come from, as bridge funding. I’ve listed them here. We have an abundance of reserves and at every level we’re confident that we can handle our immediate vulnerability in this regard.”

What about postdoctoral scholars?

“The postdoc enterprise is truly university-wide. Two-thirds of our postdocs are in the School of Medicine, a smaller percent than ten years ago—73%. It’s become more of a university-wide endeavor. Right now we have about 2000 postdocs—42% women, and 47% are on federally funded grants and fellowships. The rest are on industry funds, foundation funds, funding from states, governments, and interestingly, about 11% from university funds: designated funds, expendable funds, [and] general funds.

“Sixty percent of our postdocs are from other countries, 19 countries in all.

“I want to pause to make an announcement. The Provost has asked me to announce a decision he made earlier today. As most of you know, he allocates general funds to cover 35% of tuition for graduate students on Research Assistantships outside of the formula schools. This relieves the pressure on PIs [Principal Investigators] who are managing research grants. His contribution will be increased from 35% to 40% beginning FY14. This amounts in the next year to about $2.5 million.

“Tuition (8-10 units) for an RA is about $37,000. The Provost’s contribution is about $13,000 and with the increase from 35% to 40%, it goes up to almost $15,000, a substantial chunk of support for tuition.

“This may increase pressure on the School of Medicine, which is a formula school, to reexamine the percentage of tuition that’s covered centrally. The Dean’s office covers 19%, and 81% is charged to the funding source. Earlier this afternoon, I told the School of Medicine dean about the Provost’s announcement and he is analyzing the school’s resources in light of this decision. He did ask me to convey that raising money to fully support PhD students is a major goal of the School of Medicine’s current campaign and he’s been working with department chairs and faculty throughout the School of Medicine to be successful in meeting that goal.”

II. Diversity in Graduate Education

“We have a commitment to diversity in graduate education that’s broadly defined [and includes] race, ethnicity, first-generation students, low socioeconomic status, gender, sexual orientation, nationality, and disability. We often look at it in the context of an academic field; for example, gender in education is not so much a concern but it is in math.”
“At Stanford, we track enrollment trends along three dimensions: nationality, gender, and racial and ethnic diversity. But what matters most to us as educators is to enrich the education of our students. We believe diversity is essential for the advancement of knowledge and innovation.

“You can see the proportion of white students of our graduate enrollment has declined from 61% in 1985 to 34% in 2012. International students have had a dramatic increase from 22% to 33%. The blue line is Hispanic, showing an increase from about 3.4% to 5.5%. The red line is African-American; that increased from about 2.5% to 3%. The very bottom [pink] line is Native American, which hasn’t surpassed 1%. These three categories we often group together as domestic underrepresented minorities, ‘URMs.’”

“Of our international students, 58% come from Asia, 17% from Europe and 15% from the Americas.”
Women comprise 37% of graduate enrollment, up from 29% in 1985. “All the schools have either increased the percentage of women or stayed roughly the same. Dramatic increases have occurred in particular in the School of Engineering and the School of Earth Sciences.”

VPGE Gumport called attention to differences in the percent of women graduate students among departments. “I’ve listed departments in Engineering and Natural Sciences and you can see dramatic differences. For example, Biology is 51% female, and Math 13%. In Engineering, Aero-Astro and Computer Science fewer than 20% of the graduate students are female. The reason we look at this is to ask: is there sufficient critical mass?”

The next slide was a bar graph comparing the ethnic composition in Stanford’s graduate students with those of Harvard, Yale, Princeton and MIT. “Underrepresented Minorities. “We peaked in 1995 in terms of our underrepresented minorities as a proportion of our graduate enrollment at 10.7%; and at this point we’re at 9.3%. We’ve been holding steady for the last couple of years. It’s important to note that even though we haven’t reached the previous peak in percent, we do have a higher number of underrepresented minorities at this time.”
“With women, there were only four science and engineering departments that were under 20%; with our underrepresented minorities all but one S&E department is under 10%, so the issues of critical mass become extra salient.”

The next slide was a graph of doctoral admit rates and yield between 1995 and 2012. The white admit rate declined from 17% to 10%, while the yield rate bounced between 40% and 50%. The URM admit rate also declined from 15% to 10% while the yield bounced between 45% and 60%. [A lower admit rate means that we are becoming more selective, and a higher yield means that students we admit find us more attractive.]

“This is why we spend a great deal of time doing campus preview events and other communications to increase the probability that the students we admit will actually come.”

A table was shown of total number of PhDs awarded to URM students between 2002 and 2012. The total was 434—146 African American, 259 Hispanic and 29 Native American. By school, 19% of the PhDs granted in Education were to URM students, 12% each in Medicine and the Humanities and Arts, and 10% of the doctorates awarded in H&S’s division of Social Sciences.
VPGE Gumport reviewed examples of graduate diversity initiatives, which include recruitment.

Slide: Diversity Initiatives: Supplement Schools
Recruitment: Expand applicant pool & increase yield
- Campus Visits: Travel costs; GRAD Diversity Day (March 8, 2013)
- Prestigious Doctoral Fellowships (e.g., CCSRE)
- Summer Undergraduate Research Experiences

Retention: Promote academic success
- Dissertation research funds
- Mentoring / professional support: Women in Science & Engineering (WISE; WISSH); Enhancing Diversity in Graduate Education (EDGE)

Diversify the Professoriate: Promote academic careers
- Distinguished Alumni Scholars Program
- Diversifying Academia, Recruiting Excellence (DARE) Doctoral Fellowship Program

“Tomorrow is Graduate Diversity Day. I know a number of you are coming to the events and we have a reception the end of the day. One of the things that has been extremely effective is a summer undergraduate research experience. It’s spearheaded by H&S, Engineering, and Earth Sciences in particular.

“The other two categories I think are worth noting. There’s a great deal we do to promote academic success. We also have a number of ‘pipeline programs’ to promote academic careers. I’ve been working closely with Karen Cook (VPFDD) and Harry Elam (VPUE) to look at our pipeline initiatives that start early and go all the way through.

“The DARE [Diversifying, Academia, Recruiting, Excellence] Doctoral Fellowship Program is our signature program to diversify the professoriate. We now have 78 students who have each gotten two-year fellowships toward the end of their PhDs; these are exceptional students. The students are drawn from six schools and 30 different departments. They been enormously successful in getting jobs; we have 15 already in faculty positions at wonderful places, another 14 in postdoc positions, who are really thriving. Each cohort we get brings more talent and passion for the professoriate. The Provost supports this program with general funds.

“What can faculty do that leads to student success?” A slide listed major factors, including campus climate, mentoring and funding. Commenting on mentoring, she said “This isn’t just for URM students, or women who are few in number in their fields. [This is an important role for you to play for all our students].

“We don’t stop long enough to talk to them about what’s satisfying to us, why we do this work, and why it’s so important to us. Even short conversations can be life-changing for students. Students in PhD programs have said, ‘I am here because one faculty member asked me, Have you considered a PhD program?’”
"When I think about this area, two things come to mind; first of all, there are huge disciplinary differences. In Engineering, many people choose careers outside of academia. National data show that about 12% of Engineering PhDs go into academia, whereas in Humanities it’s much higher.

“For those of our PhD students who have been inspired to get faculty positions, especially tenure-line faculty positions, we’re very concerned because such positions are less available, and less desirable—in the eyes of many students. Right now, over 50% of new hires for faculty positions are non-tenure-line hires.

“There are other kinds of positions in academia—such as research staff, academic administration; we have enormously talented PhDs who are in academic administration on this campus.

“The last point is that we have a number of resources around the university to help students prepare for different career paths, and I think we are only now beginning to make this a more robust set of resources.”
Slide: Stanford Resources and Opportunities
For departments: academic innovation funds
• SCORE (faculty) & SPICE (students)
For students: professional development resources beyond departments
• Writing & Speaking
• Enhancing Interpersonal Skills
• Working in Diverse Teams
• Developing Life Skills
• Planning Career Paths

“In my office we have academic innovation funds for departments to rethink their academic practices. SCORE is VPGE’s Strengthening the Core innovation funds. What these funds enable faculty in a department to do is to say, ‘Ok, how are we doing with regard to preparing our students for alternative careers?’ These are opportunities for departments to think about what they can do differently, including changing curricular requirements and research training experiences.

“For students’ professional development, many resources are available from around the campus, not supported by just the VPGE. I’ve listed many skills we think students need to develop and the corresponding resources that we’re offering beyond departments.

“There’s two things to point out here: One, we do it in a way that does not distract students from making good, swift progress on their degrees. In fact, many of the students we talk to who do these workshops, and seminars, and dinners, and have these other experiences, say they leave increasingly focused and more determined to finish quickly. They get a more robust set of skills.

“The second point is that it’s not just people outside of academia who need these skills; people choosing academic careers need them too.

“The third point is that these things are teachable—including leadership skills—and [students] want to do them and they’re enjoying them.

That concluded VPGE Gumport’s formal presentation.

[ Applause ]

Chair Levitt opened the floor for questions.

Professor Margaret Fuller was the first questioner. “On the graph of percent of Diversity, the line went up to a peak around 1995 and then it kind of twisted down. What changed?”

VPGE Gumport replied, “One of the things that changed was that until 1991 there was a central office, the Graduate Division, that distributed fellowships and did
recruitment and outreach. When it was disbanded, the funds and the responsibilities moved to the schools. I’m happy to say that a number of school deans have made diversity a priority.”

Professor Fuller followed up, “Well, should we go back to that practice?”

VPGE Gumport replied, “No, because a number of school deans are making it a priority to increase the available funds. I don’t mean to put you on the spot, Dean Saller, but you’ve made this a priority. It’s been such a success, would you mind saying a word about it?”

Dean Richard Saller replied, “We are providing incentive funds. This year the bottleneck has been the number of qualified candidates. We make an effort trying to support all of the applicants and to generate more applications.”

Chair Levitt commented: “And there are two different denominators; one is all students, including international students and the other is domestic students. And we’re pretty close to the peak in terms of percentage of domestic students, of where we were. Whereas the other one’s gone down because we have a lot more international students.”

Professor Parviz Moin had two questions: “One is about your slide that had to do with graduate student funding. I was wondering what fraction of the graduate student funding is from the National Fellowships, like the NSF Graduate Research Fellowships? As for National Defense Science and Engineering Graduate Fellowships, which category would that be in?”

VPGE Gumport replied, “That would be included in the red portion [External Grants and Contracts]. We haven’t broken out the NSF and NDSEG as a proportion of the $84 million.”

Professor Moin followed up, “Even though that’s something that the students obtain directly themselves?”

VPGE Gumport nodded, “Correct. We put them in that bundle because the funds for the NSF GRF are given to the University through the office of Undergraduate Admissions and Financial Aid. And we then allocated them out to the schools when we made this chart.”

Professor Moin said, “My other question had to do with the underrepresented minorities. Is that still based on race, or does it include socially and economically disadvantaged Americans?”

VPGE Gumport replied, “The category of underrepresented minorities that we have tracked since 1985 consists of African American, Hispanic, and Native American.”
Professor Moin had another question, “What about, the poor white American, or the Appalachian, or [someone] from the farm country, do they have access to additional resources?”

VPGE Gumport responded, “We don’t track socioeconomic background, because we don’t get that information on the applications in the way that we do on undergraduate applications, but the resources that we provide on the campus are in the category of diversity broadly defined, so we purposely seek out people who come from lower-income levels.”

Professor Debra Satz commented, “I think you’re doing really fantastic things. I wanted to ask about the slow growth in the URM population. Have we reached out to other colleges and universities around the country, like state institutions, and tried to partner with them to pick out talented kids and develop them for graduate work? Do we reach below that level? I know the Medical School has some programs that even go into the high schools. It strikes me that the pipeline may start a lot earlier.”

VPGE Gumport replied, “We are making some efforts; I want to credit especially the diversity officers in the schools for doing this, and also organizing programs like the Summer Undergraduate Research Program, and hand-picking students from these places to actually bring them here, so they begin to learn about research and establish relationships with Stanford faculty well before applying to grad school.”

Professor Mark Zoback had the last word. “This isn’t a question, it’s a message from Dean Matson [of the School of Earth Sciences] who couldn’t be here today. She wanted to let you and everyone know that our graduate students are finding your programs that you mentioned briefly, on your next to last slide, incredibly helpful. And the Graduate Students Association went out of their way to tell her that your session on Imposter Syndrome—I don’t know what that is, exactly, but —

[ Laughter ]

Professor Zoback, “…was extremely helpful! They’re actually asking for more. So these programs are having a big impact on the quality of life of our students and they’re greatly appreciated. And when you start offering them to the faculty, please let us know.”

Professor John Ioannidis asked, “Do you have any data on what is happening to the graduates five or ten years down the road after they get their degree?”

VPGE Gumport replied, “That’s a good question. We don’t, university-wide, but we intend to get it. We have a new director of institutional research who will have additional resources to expand our capacity to get data on placement and outcomes.”

[ Applause ]
B. **Dean's Report: Dean of the Graduate School of Education, Claude Steele**

Chair Levitt introduced the next speaker. “Our second report today is from Claude Steele, the relatively new Dean of the Graduate School of Education.”

Dean Steele began his presentation. “Thank you. I’ll begin with an attempt to characterize, briefly, the state of education in America, because that’s something the Ed School is very much thinking about in its development and evolution.

“Since Jefferson we’ve taken as a tenet of our society that an educated populace is critical to a democracy. And in recent decades we’ve begun to appreciate the importance of an educated populace for our economy, and that our international competitiveness depends to a very significant degree on having an educated population. *The New York Times* recently caused considerable alarm by reporting what’s going on in China. The investment that’s being made there in education is a route to building human capital and given the size of their population, this is a real strategy for building strength in the 21st century. They would, for example, like to have by the year 2030 as many college graduates as we have people in our entire workforce. And they would like to have by the year 2020 three years of preschool for every citizen.

“I don’t have to emphasize the contrast that that provides to our own society. In our top 50 cities we graduate less than 50% of our students in the ninth grade. In cities like Detroit, the graduation rate is 21%. And Detroit is not alone in that distinction.

“So, what to do? I want to argue today that the Graduate School of Education, a great research-oriented school, can play a significant role in solving this problem. I’m going to argue that we can make education smarter in all of its aspects—and that that’s an extremely important and perhaps overlooked strategy. But before I get into that argument I first want to give you some general statistics and a framework about the School of Education: who’s in it, what’s going on there, what the programs are and so forth.”

The Graduate School of Education

“The GSE is the nation’s fourth oldest school of education. Stanford had an education department when it opened in 1891, but it didn’t become a school until 1917. It is an interdisciplinary school with 54 faculty members: economists, psychologists, linguists, sociologists, anthropologists, philosophers, educational scholars, and practitioners. We have about 400 graduate students; roughly 200 are in PhD programs and 200 are in Master’s degree programs.

“We group ourselves into three general areas; two of them are disciplinary and one is a professional area. The two disciplinary areas are 1) developmental and psychological sciences, and 2) the social sciences, history and philosophy. Our third division is in curriculum studies and teacher education.”
“We offer a PhD in eighteen fields—International Comparative Education, Developmental Psychological Sciences, Economics of Education, Sociology of Education, Organizational Studies, and so on. We have six master’s degree programs—Policy Organization, Leadership Studies, Learning Design and Technology, and so on. We have two joint programs with other schools, a very large joint program with the Business School and a joint program with the Law School.

“In addition to producing scholars and researchers we also produce innovators; ‘Edupreneurs’ as we call them, and we’ve helped them launch a whole variety of programs, for example, TeachAIDS, MotionMath, and GogoGames. These are startups begun by students, typically graduating from our Learning Design and Technology Program. Also our video technology is used widely to evaluate teachers. We have a major effort ongoing in that regard. Our faculty offers guidance to a lot of companies and non-profits that would be familiar to you: Pearson [an education company], Disney, Sesame Street, and so on.

“As the Daily reported last week, we have begun an undergraduate minor. That one undergraduate program is enjoying a great burst of enthusiasm among undergraduates, so we’re happy about that.

“The GSE is one of four professional schools at Stanford and we do the same things that most professional schools do. A big part of what we do is basic research and scholarship. In our case it’s human learning and development, measurement, organizational studies, normative questions about education. We also do an awful lot of applied and translational research in educational technology, such as the art and science of teaching, school policy, school financing. Finally, we train professionals—the next generation of teachers, superintendents, principals, scholars and, as I said, entrepreneurs.

“The GSE is currently ranked fourth among the nation’s education schools. This kind of irritates me a little because I think the reason we’re fourth is that we don’t have the size to get to a big total research grant dollar figure that would raise us in the rankings, in relation to some of our peers, but consistently, over the last 40 years, our faculty has been trading, off and on, with Harvard, for Number 1 in the nation. Compared to other schools we have more presidents of the American Educational Research Association, more faculty on the EduScholars ranking of the Nation’s Most Influential Education School Faculty, and more members of the National Academy of Education, than any other Ed school.”

The educational challenges of the 21st Century

“The question is—how do we use these assets to address the educational challenges of the 21st Century? What can we do here?

“The case of Medicine stands for us as an instructive analogy. In the face of its greatest challenges, cancer, for example, real and lasting progress has come primarily
from high-quality research and science and from evidence-based training of doctors, nurses, and medical staff. The Graduate School of Education makes the same assumption about education, that the best way to make lasting progress in our schools is to pursue improvement through strategies based on high-quality research, science, scholarship, and through evidence-based training of leaders and teachers. In a word, the aim of the GSE is to make education ‘smart.’

“In the United States, with regard to improving our schools, we’ve relied for the most part, as is true in other societies, an awful lot on school reforms, which have an element of being the fashion of the day. In the United States we’ve had wave after wave of school reform. We have certainly learned from these reforms; but they haven’t worked in very powerful ways. Our hope is a science-based research-based approach can be thought of as an alternative strategy for having a significant impact.

“In a great graduate school like ours, the GSE is betting that, like the progress in medicine and other walks of life, genuine progress in schools is most likely to come from high-quality research. Our bet is smart education, that it is made stronger, by the emergence of several factors that converge to make education research stronger less impressionistic, more rigorous, more penetrating.”

Slide:
Smart Education:
A New Era in the Science of Learning
• Big data
• Learning analytics and innovative uses of technology
• New statistical techniques
• Developments in cognitive/neuroscience

“The first of these developments is the availability of ‘big data.’ The proliferation of new learning and gaming technologies means that every keystroke, every finger swipe, produces data that can give us insights into how people learn and how they can be engaged and taught, enabling a new field, for example, of Learning Analytics. Another aspect of big data is the fact that in recent decades schools have begun to collect huge datasets, test performance, demographic details, human resource information, and time management information. Last month, for example, our graduate school became the first school in the nation to receive the Department of Education’s datasets, with test scores from every state, district, school, in every 2nd–8th grade classroom dating back the last five years. With data like that you can begin to sort out what works, and what doesn’t work in schooling in a more powerful way than we’ve been able to do until now.

“Also, there’s an evolution in statistical techniques that we can use to analyze data like these. We have also imported from other social sciences a family of sophisticated statistical techniques that give us a great deal more power.
“Finally, there’s an expansion in brain science, which President Obama’s how just made a national priority, that promises insights into how the brain enables a response to, and retains learning.

“I’ll give you just a few examples from our own faculty. Video games, for example, provide an opportunity to make education smarter. Dan Schwartz, one of our senior professors, has developed a suite of video games that enable him to measure the tendency toward critical thinking in middle school students. Using one particular game, Dan looked at whether a student stops to think first, when trying to solve a problem, or jumps in and kind of messes around in search of a problem. The object of the game is to get a performing cartoon otter to sing. What you have to do is mix colors in a certain way to produce a white light, and as soon as you do and shine that white light on the otter, the otter sings, breaks into ‘Rockin Robin,’ or something like that. The kid knows they’ve got the right answer, they get reinforcement, and they go on.

“The student can take one of two options: She can consult first a light catalog, to determine how to mix the desired colors to get a white light, that is, stop and study the situation, or she can just jump in, trying to find a white light as best as she can. Her choice, it turns out, says a lot about the way she’s likely to solve problems in other situations.

“Dan’s little game about the otter seems kind of silly at first glance, but it provides a simple way to measure students’ predisposition to use critical thinking and use it early in problem-solving. And it answers an important question: does the tendency to engage first in critical thinking help in solving immediate problems, like the otter problem? And does it predict success in other areas, like, for example, math performance in school? The answers to both of those questions is a resounding, ‘Yes!’ Indeed, Dan’s game shows that the tendency to engage in critical thinking, as measured through this game, is more predictive of how students will do in math than is earlier math performance.

“This simple video game shows smart education in action. It identifies a skill that is essential to math learning, it offers an easy, scalable way to measure that skill and whether a student has a predisposition to use it, and it gives a teacher a precise knowledge of what students need to know and which students need help in order to improve in math.

“In that game, you get some sense of what’s being called a blended classroom, where these technologies move into classrooms and provide a different level of information to teachers about the progress of their students, and about what skills and critical thinking are making progress and so on.”
“Let’s look at another example of smarter education in action. This is from Sean Reardon’s research. By assembling large data sets from nationally representative samples of US test-takers going back decades, data sets that include race and income markers, Sean was able to track the size of the achievement test gap between black and white Americans, and between people in the top and bottom fifths of income distribution. The blue line is for the white-black gap over those years, and the red line is for the income gap between the top and bottom fifths of population. Roughly sixty years ago the gap in tested achievement between the wealthiest and poorest Americans was not that great, not nearly as great as the achievement gap between white and black Americans, but in the years that have followed, while the white-black gap in tested achievement has gotten smaller—still disturbingly large, but getting smaller—the tested achievement between rich and poor Americans has gotten persistently larger, to the point that it is now twice the size of the current racial gap in tested achievement.

“This finding challenges the basic American assumption that our schools are serving as a primary route to equal opportunity for everyone. Moreover—but not shown here—this income gap, is present when children begin their schooling on the first day of kindergarten and it doesn’t change a great deal over the course of schooling.

“Sean’s research has some pretty clear policy implications; it identifies how income has become one of the most powerful predictors in academic achievement; and it recasts the urgency of focusing on schools that serve low-income populations. It also points toward a solution that could go a long way to addressing the problem; it encourages us to focus on early childhood education to close the achievement gap. Sean’s finding played a significant role in the Obama Administration’s recent proposal to stress universal preschool. And it wouldn’t have come to light without
Sean’s ingenious assembly of this large data set going back some sixty years, so you can really track these changes in these gaps.

“So this makes education smarter. A harder question that the school is taking up is—can research aimed at making education smarter in ways like this actually make a discernable difference in urban American school districts?

“The Graduate School of Education has established a research partnership with San Francisco Unified School District that puts this question to the test. That partnership also introduces another principle of smart education, and a very important one: the school district itself has a say over what research gets done. They can direct research to the major problems that they are having. We have a full-time coordinator arranging happy marriages between the needs of the school district and the researchers in the school. Over time the research in that district starts to be more and more focused on the issues that are important to the school district, and, as you will see, over time the school district starts to use that research in making their daily decisions.

“We now have 24 projects in San Francisco Unified, that involve about $10 million in grants, and 150 researchers and practitioners, in a district of about 55,000 students and 3,000 teachers. After two years I think we have some encouraging indications, certainly not definitive proof, that this kind of partnership with the school system can have an effect on the overall performance of the system.”

Growing Collaboration: GSE Partnership with SFUSD

“This slide shows that over the last three years the research that the GSE does in San Francisco Unified is increasingly targeted at the announced needs of the district. And that an increasing percentage of teachers and district personnel consult GSE research to shape their practice and to inform their decisions. For example, our research has
helped the district eliminate ineffective language learner programs; helped it better assess pre-K reading levels and target instruction at the actual level of the students; helped it identify high school students who are at risk of not graduating and what early predictors are of students at risk; [and] helped it to enhance the English and history instruction in the district in a major way. Our research has determined how principals should best spend their time: Should they coach their teachers individually, or should they visit classes? It turns out coaching is much more important than visiting teachers’ classes.

“Finally, it helps the district determine where to best devote its scarce resources, especially in California districts, under huge financial pressure.”

**Improving Performance: GSE Partnership with SFUSD**

“This slide shows that as the GSE research in the district grew more targeted to district needs, there was a modest tendency for the district’s test scores to go up, to go from being a failing district, by the No-Child-Left-Behind standards, with an academic performance index and API score below 800, to being a passing district with an average API score of above 800. This is a big deal; there are not many urban districts that are in that category.

“San Francisco is a wealthy city and has a relatively stable middle class population; that’s why its scores are relatively high in general, but the partnership is having an impact on improving that performance.

“If you made a policy decision, like reducing class sizes, increasing teacher pay, increasing the number of charter schools, for example, and carried it out and you saw this kind of change in a school district, you’d be happy. You’d make a claim that that policy was having a positive effect. So we believe that by focusing great resources on
a broad array of the challenges of the district, that could give schools a powerful R&D capacity, improve their performance. This is the theory of action.

“How do we extend this smart education and this strategy of continuous improvement? Well, we take on a few more partnerships and we focus our involvements more. Our faculty are involved in nearly a hundred school districts nationwide. What we’re finding is that when you focus those involvements more on a smaller number of districts, like in our case the single district of San Francisco, and the research does have a cumulative effect on the performance of the district, then a direction for us to grow would be to adopt another district. We have adopted Redwood City and we’re having conversations with Oakland, which is obviously a very challenging district. If you could show some effect there that would be a really powerful demonstration of this strategy.

“Also, we are designing an education clinic within the GSE focused on continuous improvement. Such a clinic would invite school leaders, policymakers, and teachers to bring in issues and challenges that they are facing, for which they believe expert advice would help and then partner with the most relevant faculty and students. This would have to be incentivized in various ways, through course release and summer salaries, there have to be incentives here. But there’d be a partnership between an educator coming in with a problem and our faculty and students, and they would stick together these teams and would pursue a design-school type research to iteratively develop prototype solutions to educational challenges they face in real schools. This would be the first of its kind clinic for Ed Schools, although it’s important to stress that we do this kind of iterative research with a number of school districts now, so it will be a bringing together of that effort.”

Future Priorities

“We have spent the past year in a school-wide strategic planning exercise to answer the basic question: How can we be a great graduate school of education? How do we expand ourselves to address these major educational challenges in the country? I’ve just described to you one of the strategies we have but as a result of that planning, we have identified two areas that we’d like the school to grow in.

“One area is the impact of technology on learning and education. This is kind of a birthright of an Ed School in Silicon Valley at this point. We’ve already taken steps in that direction. Our lecture series, Education’s Digital Future, that we’ve offered, provides a campus-wide venue for learning about and discussing online learning issues and their implications for higher education, as well as the implications of technology for education more broadly. These Tuesday night sessions, which I recommend to all of you, have really gotten quite popular. The attendance is in the 300-range of faculty and graduate students from Stanford, and entrepreneurs and venture capitalists from the Valley, so it’s gotten to be a place where you can come and find out about the impact of educational technology in its future directions.
“We’re also beginning a collaboration with the School of Engineering and we’ll form a joint center in the near future to better integrate learning science with the construction of online learning platforms. This is a very happy marriage between these two areas of expertise.

“And one big hope I think everybody in the Valley holds is that technology will really be helpful in extending quality education to a much broader section of the population than has ever had access to it. And that this is something to invest in—and that brings us to the second priority that this strategic planning exercise has produced: to expand the nation’s capacity to deliver quality education to low-income students. Our challenge, the heart of our nation’s struggle, with regard to its competitiveness, is in the sector of low-income students and how poorly they’re doing, especially urban lower income students where you have large, impoverished communities, schools that are under tremendous distress, and not functioning well. A good sector of our population — 25% of America’s children — live in poverty. And that fact is a huge part of this problem.

“In addition to these goals we are also developing a plan to develop a new platform to elevate the visibility and the impact and dissemination of our research and training.

“The Stanford Institute for Educational Innovation would be the first of its kind nationally; it would integrate our strong research centers in the Graduate School of Education that have evolved over the last decade. These centers focus on issues like learning analytics and the relationship between technology and education, economic policy analysis, the nature of good teaching and teacher education, the impact of community organizations on education, and inequities in educational opportunity. These are large centers; for example, their revenues range from $3 million to $8 million a year, but they’ve been so scattered around the Ed School that their collective impact hasn’t been appreciated as much as it should.

“An overarching interdisciplinary institute that brings these centers together, and draws from across campus would make the huge problem-solving focus of the GSE more visible. It would do a variety of other things that are good: It would achieve some useful economies of scale, it would capitalize on strengths that we already have, it would lend a certain gravitas to this notion of smart education, and it would unite a powerful intellectual community on-campus nationally and internationally, focused on education and its challenges. It would create a whole greater than the sum of its very good parts. And it would represent an opportunity for Stanford, as a university, to assert the importance of education and education research, and evidence-based training in education.”

Dean Steele concluded his presentation. “So these things, evidence-based research, data-driven change, new technologies, learning analytics, advanced statistics; all of these things are what we mean by smart education. It represents, we believe, a new era in the science of learning, and it can shape the practice of learning in every
classroom for every child and the Stanford Graduate School of Education is up for ushering this in, helping to usher this in.”

“Thank you.”

[ Applause ]

Chair Levitt opened the floor for questions.

Professor David Spiegel was the first questioner. “Thank you for the inspiring presentation. You mentioned the analogy with the School of Medicine. One thing that’s benefited us tremendously was the move from San Francisco to Stanford, the integration across disciplines, and our research. And I wonder if you can expand on that in your comment; it would be obvious that disciplines like Earth Science or Electrical Engineering would benefit from your research. Could you expand on how the Ed School is collaborating with other parts of the campus?”

Dean Steele nodded. “Many faculty in the GSE have collaborative relationships with people in other places, from neuroscience to technology to engineering—those are the big things that come to mind. Another is the Design School; there are big involvements between it and the GSE. One reason we’re interested in creating the Institute is that it would be a place to pull these things together and to structure these kinds of exchanges more formally.

“The birth of a formal shared program with the Engineering School is underway. But I think it’s important to stress that I’m not sure every campus could approach education this way, because they don’t have the kind of seamless relationship between schools that we have here. The kind of involvements that faculty take for granted here make these enterprises a lot stronger than they’d be if they were just in an isolated school of education.”

Professor Rosemary Knight commented, “Great presentation! Lots of exciting things going on. I was curious to hear more about the education clinic that you mentioned. That sounds really interesting. What’s the scale, how many faculty, how many grad students, and who are your clients? Are you working one-on-one with schools, are they all local, or are you a bit concerned about being overwhelmed with clients?”

[ Laughter ]

Dean Steele responded, “This clinic is in the very early stages of development. But there are prototype relationships going on already. Our John Gardner Center has a relationship with Redwood City that I would characterize as a clinic. That is, they stayed with that school system and dealt with a variety of problems that that school system has brought to the John Gardner Center.”
Professor Knight clarified, “So it’s not a one-off, short-term, one-month long sort of thing.”

Deane Steele agreed, “Right. The idea is you stick together. And you get [familiar] with the district schools and the challenges it faces. For example, in that clinical relationship or clinical partnership, you can make a pretty strong case that you can detect real vulnerabilities in schooling and kids by their attendance record in kindergarten and in first grade. When attendance is bad there, that signals a real issue that continues to grow. If we can intervene at that level you can start to have an impact on things that would be much harder to remedy if you waited until later on.

“It’s having access to the data across all those years of schooling and it’s Stanford having a continuous relationship with that district that enables those insights to come to light. And that’s what we’d like to elaborate into a full-blown clinic within the School.”

Professor Olav Solgaard, referring to the slide showing the widening income gap in tests of achievement, said, “This is very disturbing. If I understood you correctly, socioeconomic status has become an increasingly strong indicator of educational success. That is surprising to me and maybe it is an indictment of the public school system. If you are focusing on preschool as one of the remedies for that, it seems to me that does not go far enough. I mean, the whole K-12, at least, and maybe beyond that, needs to react to that. If it is really true, it is very worrisome track. Is preschool a solution to that?”

Dean Steele replied, “I couldn’t agree with you more [on] your sense of alarm. I think that sense of alarm is broadly shared by a lot of us. Think about the way low-income or poverty affects a person—you can think of it as a gauntlet of things beginning in utero that affect a child as he or she goes through life, all the way up to when they enter school. And those events, you know, the desolation of the neighborhoods they live in, the family structures that are under stress, the language they’re exposed to, a whole variety of factors concentrate to bring children to school with some real serious disadvantages.”

Professor Solgaard followed up. “Why is it getting worse? Why is the indicator getting stronger? I mean, you’d think that we were working on those problems, that we’d be getting better.”

Dean Steele replied, “We are working on those problems, but not working enough. There is a larger and larger percentage of kids who are in poverty in the United States. If you look at our PISA [Program in International Student Assessment] scores—these are the scores that we use to compare ourselves with the high-performing school countries like Finland, South Korea, and so on—Professor Martin Carnoy analyzed the scores. He found that when you control for social class and the effects of poverty, we go way up in the rankings, which is a pretty good indication of the role that these economic factors are playing in keeping us down at this point.”
“I think you do need a great emphasis on preschool, but I don’t think it’s enough. Our experience with HeadStart for example is you put a lot of resources into a HeadStart, but then you put the children back into bad schools and you lose the gains you got from that prior investment.”

Professor Caroline Hoxby was the last to comment. “Thank you very much for the presentation. As you probably know, I’m a big fan of the new vision in the Graduate School of Education and many of the innovations. I think, however, if we go outside the Senate meeting, and think about the way that education is thought of more broadly in the United States, not everyone sees graduate schools of education as having contributed in a positive way over the past few decades to improving education in America.”

Dean Steele, smiling, interjected, “Tell me about it!”

[ Laughter ]

Professor Hoxby continued, “I think it would be important to document some of these changes. One of the best ways you can do that is through these partnerships with school districts where you can say, ‘We were in San Francisco, we did X, Y, and Z, and these are the changes we saw and these are the improvements in scores.’ I think that’s going to be important, if you start to work with Oakland and with San Jose. I would hope that that documentation also takes place because there are a variety of different ways to improve American education, but the ones that go through graduate schools of education are going to have to be documented if they’re going to influence the other schools of education.”

Dean Steele replied, “I couldn’t agree with you more. The school of education—I’ll speak for this school of education—does a lot of great things. We’re tremendous at training; we get tremendous talent into the school. Our students are strong; our research faculty is very strong. But the kind of things I talked about is an attempt to address that need. We want to show that in addition to those great things a professional school does, it can also make progress in relation to these big challenges that are out there.”

Chair Levitt noted, “We’re out of time. I would like to thank Dean Steele again.

[ Applause ]

VI. Unfinished Business
There was no unfinished business.
VII. New Business
There was no new business.

VIII. Adjournment
A motion to adjourn was seconded and passed unanimously. The Senate adjourned the meeting at 5:00 PM.

Respectfully submitted,

Rex L. Jamison, MD
Academic Secretary to the University
Professor of Medicine, Emeritus