

Prescript: Version 2 of this document differs from the one that I gave to the SMUHSD Board in the following way. I wrote my original response to a draft District presentation. The District's draft contained a slide with incorrect data. I included a response to that data in my version 1 and also notified the Superintendent of the error in the District's draft. That erroneous slide was no longer present in the copy that he reviewed, so I have removed discussion of it from this document also. Except for that deletion and the addition of this Prescript paragraph, the text following this paragraph is identical to what the Board was given.

Note to the reader: I was allotted six minutes to respond to a District presentation which I found out later ran to about 20 slides. There was just no way that I could do this in a persuasive fashion in six minutes. I thought first about writing a short and long version of the following material, then just thought about bolding the text below that I would actually speak, but even in this second case I could not meet the time restriction. I will therefore speak extemporaneously for the allotted time and sincerely hope that you carefully read the following version that I expanded to include all important points. I do not expect to get another chance to address this critical issue. If you have any questions, please feel free to contact me by email or via the contact page at my blog eduissues.com. - Dr. David Kristofferson, 3/7/19

Thank you for allowing me the opportunity to respond to the District's presentation on NGSS.

Last March 8th, besides raising concerns here about the NGSS adoption process, I listened with interest to two other topics. One was a student survey stating that about 20% of the SMUHSD students were "sad." This provoked extensive discussion as to the cause. The other topic was a review of data on the achievement gap and what could be done to fix it.

The NGSS adoption, the student psychological survey, and the achievement gap issues are all intertwined as I will explain, but **I first need to describe my background to you and the audience, so that I am not simply perceived as an old geezer who opposes all change.**

I have a B.A. in Chemical Physics from UCSD, a Ph.D. in Biochemistry from UCSB, and did postdoctoral research at UCSF. I have an MBA from UC Berkeley and a UNIX technical certification from UCSC. While still in graduate school, I published 9 research papers in prestigious journals such as the Journal of Biological Chemistry and the Proceedings of the National Academy of Science.

I was offered postdoctoral research positions by a Nobel Laureate at MIT and a future Nobel Laureate at Yale, but decided to work at UCSF for a professor of biophysics who was also president of the American Biophysical Society. I later had a second research position with the president of the American Society of Cell Biology who is now at Harvard.

I declined a professorship of my own and joined a molecular biology software startup in Silicon Valley where I became the manager of an NIH-funded DNA and protein sequence computing center called BIONET. I later managed the GenBank national nucleic acid sequence database. I was in on the beginnings of the Human Genome project and was an early advocate of the use

of the Internet for genomic research. This work led to my being selected as a Fellow of the American Association for the Advancement of Science.

I hesitate to bring the above up because it tends to provoke the reaction from teachers that I am all theoretical but have no classroom smarts. I have taught both high school and college physics, college chemistry, environmental science, and math up through and including calculus in both California high schools and colleges and in the Peace Corps. I have taught under some arduous conditions with inner city kids, some of whom were on parole. I have also substitute taught in every high school in SMUHSD including the continuation school. I also served as the first chairperson of the Measure C Citizens Oversight Committee and played an important role in the rebuilding of San Mateo High School. Both of my daughters went to Aragon and my younger daughter Amy was a valedictorian there. I know the District well.

I am now retired, and have tried hard to pass my knowledge on to the youth in our community through my tutoring work during the past seven years. My goal is to impart the excitement I felt about science when I was a student to today's young people, far too many of whom appear to prefer nontechnical fields.

After doing this primarily with Aragon students for my first four years, I kept running into the same recurring problems and decided that I needed to address them through my blog at eduissues.com (which has had over 13,000 visitors since it began in October 2016) and via lobbying efforts instead of only putting band-aids on my individual students. I have pursued these efforts for the past three years and have achieved some successes as noted in my blog articles.

NGSS

Despite meeting with several members of the SMUHSD administration, my concerns that there were problems with the new NGSS physics curriculum have been deferred for over a year now.

The District decided to implement the NGSS curriculum before textbooks were available.

I was told first that this timing was due to a pending state test deadline, then told later that the state test was not critical because students had no stake in that test and thus did not take it seriously.

Several months afterwards I met with Dr. Kempkey, who was not working for the district when these decisions were made. She gave me a different reason for proceeding before textbooks were available. Her comments paralleled the concerns in the Education Week article that I called to the Board's attention. There is a justified fear in the teaching community that publishers will sell supposedly "NGSS compliant" textbooks that are not well aligned with the standards and thus undermine the correct implementation of the standards.

Although more satisfying than the first two explanations, **this rationale still did not allay my central concern that *asking working teachers to redesign the entire science curriculum with what is only, in software industry terms, a massive "requirements specification" was a very risky decision.***

I sent the Board a link to an Education Week article cited in one of my blog articles that describes the challenges that other school districts encountered with these standards.

I tried to tell all three administrators that the regular physics worksheets that my students were bringing home were very subpar compared to the previous material that was used in regular physics at Aragon. Too much physics time, for example, was spent

on radiochemistry and half life calculations *where the ability to divide by two was sometimes the only math prerequisite*. These worksheets were a major step down compared with what had been used in Aragon's regular physics class for the last decade or so. I know because I have extensively worked through these problems for the last seven years with many students!

I want to clearly emphasize that I worked directly with students over the entire 2017-2018 school year using this new material. I doubt that any of the administrators I talked with did a similar comparison of the old versus new Aragon physics material, but all I heard was repeated defenses of the new program.

I was told about the District's great teachers and how they enthusiastically took up this work and were given extra paid time to do so. However, the amount of extra paid time, as noted in the presentation you just saw, is a drop in the bucket compared to what would be needed to redesign the science curriculum.

Let me make it clear that I am not here to bash teachers or dispute their quality. The District claims that these lessons are developed by multiple teachers and distributed to multiple schools. **That said, the quality of the physics worksheets that I saw implied to me that overburdened teachers were doing the best they could to design a new curriculum on the fly instead of continuing to use the excellent materials that had been refined by their colleagues over years.**

I believed then that the teachers were given a very difficult assignment, akin to rerouting a freeway while it is in use, and none of the meetings I attended gave me any solid evidence to refute this concern.

Dr. Kempkey was very emphatic that the NGSS standards are excellent. I did not dispute the quality of the standards, but said that **a big part of the problem was that the standards were designed to be implemented in four classes. The District chose to use a three course model to stay aligned with existing UC A-G requirements. The three course option tries to intersperse the new NGSS material on Earth and Space Science into the physics, chemistry, and biology core classes. It is logically impossible that this can be done without sacrificing topics that were previously covered in those core classes. If you read Appendix K of the NGSS standards you will see that the authors of the requirements struggle with this option.**

I realize that some other districts in California have also adopted the 3 course option for NGSS implementation and that SMUHSD is not alone in this decision. Unfortunately this is not in itself a reason to believe that this is the correct decision. There have unfortunately been significant widespread curriculum adoptions in the past that have failed miserably.

I can understand why administrators might be very impressed with the teachers' progress on NGSS. You will undoubtedly see several examples of individual excellent NGSS lessons put together by our best district teachers. However, if the overall curriculum is diluted by the 3 course option, I ask you if the test scores that the District prides itself on will continue to be high? Please note that the beginning slides in the District's presentation tonight contain data from 2016-2018. Only the 2018 year included any NGSS classes.

As an example of how hard this lesson planning task is, the Achieve organization that spearheaded the writing of the NGSS standards provided vetting tools for lesson compliance and began posting model lessons on their website according to the Education Week article that I sent to you. As of last June when the article was written 100 lessons had been submitted and only 8 were selected and posted. As of today three quarters of a year later, that number has risen to a whopping total of 14 for all of K-12!

There is a lot of emphasize in NGSS on “doing” science and hands-on learning experiences. These are undoubtedly fun and more engaging for students than traditional classroom work. They make for great shows when the administration stops by to observe, but *if we deprive students of core subject knowledge because the curriculum is diluted OR if too much time is spent in labs/hands on work (note that UC requires $\geq 20\%$), this lack of core knowledge will come back later to haunt students and impact the District’s performance results.*

Some may reply that the really good students will simply take the AP classes. It is ironic that the administration strongly defends the AP program which I find so “hyper-traditional” that many students are overwhelmed by the amount of material that they must absorb very quickly, mainly by doing homework problems!! There is a significant contrast between the approach of AP courses and NGSS, and it is hard to be logically consistent and also endorse both programs.

I used to recommend that students take regular physics before taking AP physics for reasons that I have explained on my blog. I could no longer do so after the 2017-2018 school year.

Several of my students told me that they had been counseled in early 2017 to take AP Physics 1 which “would be more like the old regular physics course at Aragon.” This indicated to me that at least some people realized that the new curriculum would have significant growing pains and tried to divert students. Unfortunately this turned out to be bad advice and resulted in students taking AP physics who were not ready for that class. They had a miserable time in it. I wrote about this on my blog and have attached the relevant College Board report pages after this text.

So let me return to how this impacts student psychology and the achievement gap issues I mentioned at the beginning.

Work overload is probably a significant reason some of our students are “sad.” I see this face-to-face, night after night and watch helplessly while these students stay up well past midnight to cope with their unrealistic course loads and expectations. AP classes were originally pitched to only the best students, but now have come to be seen as virtually essential for admission to college. Students sign up for far too many of these classes and often are not intellectually mature enough to handle the workload. This does not do wonders for their morale.

I also need to strongly emphasize that we will not close the achievement gap if we dilute our regular courses which I am concerned may be a consequence of the NGSS 3 course implementation.

Typically, parents of AP students will come to these meetings and complain if the District tried to change the AP program, but I am here tonight to also speak for those parents who cannot attend because they are working two eight hour shifts at service jobs to make ends meet, and who might be intimidated by authority even if they did try to ask questions.

So what to do? I do not realistically expect the District to reverse a decision after so much time and effort has been spent in its implementation. I wish that I could have raised these concerns much earlier. I did not know about this issue until after the train had left the station, and my students started bringing home subpar physics worksheets. **The Board and the administration needs to monitor progress carefully on a yearly basis and take corrective action if problems emerge. This means monitoring student test scores, not just observing dazzling laboratory demonstrations!!**

I have always thought that the SMUHSD was an excellent district and want to keep it that way. However, I am concerned about many national and statewide trends that may undo that excellence.

- ***At a very minimum, I implore the Board, as I requested last year, to require the District to implement an email notification list for curriculum and textbook changes, not only for parents, but also concerned citizens like myself, so that additional public input can be solicited before future curriculum experiments are made. Publishing this information solely in the crowded Board agenda is insufficient.***
- **Better yet, I would strongly encourage the District to hold an education summit with the community where these issues and the problems with AP class suitability and overload could be discussed at length. The Board meeting agenda is overburdened with administrative issues which, while very important, seriously restrict discussion of critical education issues.**

The District may reply that my request for an email notification list insults teachers' roles as professionals and restricts their ability to do their jobs. I would counter that California has a long history of educational experimentation, much of which has been imposed on teachers from above. Our children too often become involuntary experimental subjects. When I discussed this in the context of the Everyday Mathematics (EM) curriculum adopted by SMFCSD, Dr. Kempkey noted that EM is a complicated curriculum and requires professional development time. I have heard similar comments from other educators on this same topic.

However the obvious rejoinder is "why was a complicated curriculum chosen for elementary school??" Many elementary teachers already have math phobias themselves as has been discussed in Education Week. I see the problems that Everyday Math created every night in my tutoring work years after the fact.

- ***Unlike teachers, I have worked with the same students for up to six consecutive years and see first hand the continuing bad effects of these failed experiments night after night.***
- **It is high time to get additional qualified, but independent, points of view into these curriculum decisions and attempt to avoid future problems.**

There are many highly educated technical people in this community who can contribute their expertise about how curriculum is ultimately used in current scientific research and in the workplace. These resources should not be ignored, and it should not take another year to get action on such an important item!!

AP : Exam Participation and Performance (Part 2 of 3)

		# of Exams	% of Total	# Score of 1	# Score of 2	# Score of 3	# Score of 4	# Score of 5	% Score of 1	% Score of 2	% Score of 3	% Score of 4	% Score of 5
German Language and Culture	2017	1	0%										
	2018	1	0%										
Human Geography	2017	5	0%	1	1	0	1	2	20%	20%	0%	20%	40%
	2018												
Italian Language and Culture	2017	19	0%	0	0	5	9	5	0%	0%	26%	47%	26%
	2018	20	0%	0	0	7	12	1	0%	0%	35%	60%	5%
Japanese Language and Culture	2017	25	1%	0	0	8	1	16	0%	0%	32%	4%	64%
	2018	23	0%	0	1	7	4	11	0%	4%	30%	17%	48%
Latin	2017												
	2018												
Macroeconomics	2017	81	2%	13	18	11	25	14	16%	22%	14%	31%	17%
	2018	74	1%	8	15	16	24	11	11%	20%	22%	32%	15%
Microeconomics	2017	84	2%	3	5	13	37	26	4%	6%	15%	44%	31%
	2018	87	2%	8	10	19	24	26	9%	11%	22%	28%	30%
Music Theory	2017												
	2018	5	0%	0	1	0	2	2	0%	20%	0%	40%	40%
Physics 1	2017	302	6%	27	73	90	80	32	9%	24%	30%	26%	11%
	2018	397	8%	50	97	98	101	51	13%	24%	25%	25%	13%
Physics 2	2017	15	0%	0	2	3	1	9	0%	13%	20%	7%	60%
	2018	19	0%	0	3	7	6	3	0%	16%	37%	32%	16%
Physics C: Electricity and Magnetism	2017	27	1%	1	7	2	10	7	4%	26%	7%	37%	26%
	2018	21	0%	0	3	3	5	10	0%	14%	14%	24%	48%
Physics C: Mechanics	2017	51	1%	2	3	7	18	21	4%	6%	14%	35%	41%
	2018	49	1%	1	4	8	18	18	2%	8%	16%	37%	37%
Psychology	2017	190	4%	7	15	36	65	67	4%	8%	19%	34%	35%
	2018	197	4%	8	7	21	57	104	4%	4%	11%	29%	53%
Research	2017												
	2018												
Seminar	2017												
	2018												

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It only takes a test score of about 40% to pass AP Physics 1!!!!

95 = A major increase in test takers in this one subject for 2018

47 additional failures on half out of the 95 new students

2017 P
= 67%
= 63%
↑
2018
63% is
21% less than the figure in the District's graph.

including others subjects have FYI.

AP : Exam Participation and Performance (Part 1 of 3)

		# of Exams	% of Total	# Score of 1	# Score of 2	# Score of 3	# Score of 4	# Score of 5	% Score of 1	% Score of 2	% Score of 3	% Score of 4	% Score of 5
Total # of Exams	2017	4,900	100%	268	799	1,295	1,425	1,113	5%	16%	26%	29%	23%
	2018	5,215	100%	255	801	1,261	1,475	1,423	5%	15%	24%	28%	27%
Art History	2017	1	0%										
	2018												
Biology	2017	216	4%	3	21	77	78	37	1%	10%	36%	36%	17%
	2018	244	5%	1	20	77	89	57	0%	8%	32%	36%	23%
Calculus AB	2017	363	7%	23	70	91	79	100	6%	19%	25%	22%	28%
	2018	394	8%	8	62	115	100	109	2%	16%	29%	25%	28%
Calculus BC	2017	177	4%	0	9	19	33	116	0%	5%	11%	19%	66%
	2018	196	4%	4	9	26	39	118	2%	5%	13%	20%	60%
Chemistry	2017	204	4%	29	53	56	44	22	14%	26%	27%	22%	11%
	2018	248	5%	17	49	82	64	36	7%	20%	33%	26%	15%
Chinese Language and Culture	2017	99	2%	0	0	12	15	72	0%	0%	12%	15%	73%
	2018	83	2%	1	2	7	10	63	1%	2%	8%	12%	76%
Comparative Government and Politics	2017												
	2018												
Computer Science A	2017	186	4%	9	9	57	48	63	5%	5%	31%	26%	34%
	2018	220	4%	13	17	50	59	81	6%	8%	23%	27%	37%
Computer Science Principles	2017												
	2018	21	0%	0	3	12	3	3	0%	14%	57%	14%	14%
English Language and Composition	2017	690	14%	25	162	207	193	103	4%	23%	30%	28%	15%
	2018	605	12%	21	123	169	144	148	3%	20%	28%	24%	24%
English Literature and Composition	2017	233	5%	3	29	76	81	44	1%	12%	33%	35%	19%
	2018	288	6%	5	61	71	104	47	2%	21%	25%	36%	16%
Environmental Science	2017	228	5%	16	45	46	85	36	7%	20%	20%	37%	16%
	2018	262	5%	23	52	41	91	55	9%	20%	16%	35%	21%
European History	2017	265	5%	10	57	77	83	38	4%	22%	29%	31%	14%
	2018	270	5%	6	62	73	78	51	2%	23%	27%	29%	19%
French Language and Culture	2017	10	0%	0	1	1	5	3	0%	10%	10%	50%	30%
	2018	11	0%	0	1	0	7	3	0%	9%	0%	64%	27%

Average AP Scores for Every AP Exam

Halle Edwards

Taking an AP class this year? You might be wondering about average AP scores or what good AP scores are for certain classes. Or if you are thinking about taking AP exams in the future, you might want to know which exams have the highest passing rates.

In this post, we will break down the average score for each AP test, as well as the average passing rate. We will also show you how to interpret this info and how to use it to make decisions about your schedule.

Average AP Score by Test

Instead of giving you an overall average score for all AP tests, we will show you the average score for every AP exam. We break it down by test because every AP test is different. It's important to know the average score for whichever test you are taking or thinking about taking.

We will also explore how you can use this info—and learn why the exams with the highest passing rates are not the easiest!

But first, the data. The table contains the national average scores for each AP exam from 2018. **Remember that AP exams are scored from 1 to 5, with 3 and higher considered passing rates.**

We have sorted the exams from highest average score to lowest. Take a look:

AP Test	Average Score

Chinese Language	4.31
Calculus BC	3.74
Japanese Language	3.70
Spanish Language	3.69
Studio Art Drawing	3.65
Physics C E&M	3.60
Physics C Mechanics	3.55
Studio Art 2-D Design	3.48
Spanish Language (Standard)	3.45
French Language	3.32
German Language	3.31
Economics - Micro	3.21
Computer Science A	3.18
Music Theory	3.18
Research	3.17
French Language (Standard)	3.16
Seminar	3.15
Italian Language	3.14
Psychology	3.14
Gov. and Politics - Comparative	3.12
Computer Science Principles	3.11
Studio Art 3-D Design	3.11
Chinese Language (Standard)	3.06
Spanish Literature	3.06
Calculus AB	3.05
Art History	3.04
Physics 2	2.97
German Language (Standard)	2.96
Economics - Macro	2.96

↑
PASS
↓
FAIL
(and on to next page)

Latin	2.94
Japanese Language (Standard)	2.89
European History	2.89
Italian Language (Standard)	2.88
Statistics	2.88
Biology	2.87
English Language	2.83
Chemistry	2.80
World History	2.78
Human Geography	2.72
Gov. and Politics - US	2.70
United States History	2.66
Environmental Science	2.63
English Literature	2.57
Physics 1	2.36

LAST
PLACE even
though only ~40% correct
is needed to pass!!!

This should at the very
least make one
pause and wonder
about the suitability
of AP Physics for most
high school students!!!

Via College Board. Check out the link for a complete distribution of scores
for each AP exam.