
Committee Meeting

of

JOINT COMMITTEE ON THE PUBLIC SCHOOLS

*"Appearing before the Committee will be Dr. Robert Goodman and
Dr. Rosemary Knab from the New Jersey Center for Teaching and Learning"*

LOCATION: Committee Room 16
State House Annex
Trenton, New Jersey

DATE: May 25, 2011
10:00 a.m.

MEMBERS OF COMMITTEE PRESENT:

Senator Ronald L. Rice, Co-Chair
Assemblywoman Joan M. Voss, Co-Chair
Assemblywoman Mila M. Jasey
Assemblyman David W. Wolfe



ALSO PRESENT:

Melanie Schulz
Executive Director

Meeting Recorded and Transcribed by
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TABLE OF CONTENTS

	<u>Page</u>
Rosemary Knab, Ph.D. Secretary-Treasurer Board of Trustees New Jersey Center for Teaching and Learning	4
Robert Goodman, Ed.D. Director New Jersey Center for Teaching and Learning	8
Timothy Panebianco Coordinator Program Development New Jersey Center for Teaching and Learning	29
Peggy Stewart Member Board of Trustees New Jersey Center for Teaching and Learning	43
Susan Polirstok, Ed.D. Dean College of Education Kean University	50
Mona Dana Representing New Jersey Center for Teaching and Learning	60
Rosanna Satterfield Curriculum Developer New Jersey Center for Teaching and Learning	65
Elizabeth Henriquez Faculty, Curriculum Director New Jersey Center for Teaching and Learning	68

TABLE OF CONTENTS (continued)

APPENDIX

PowerPoint presentation
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New Jersey Center for Teaching and Learning

Page

1x

rs: 1-79

SENATOR RONALD L. RICE (Co-Chair): Good morning.
(no response)

Let's try that one more time. This Committee likes it like church. Good morning. (laughter) (audience responds)

All right. We have educators out there? Come on now. What kind of classroom-- I'm going to have to put Assemblyman Wolfe on you about the classroom. When he goes into the classroom in the morning, his kids respond.

Right, Assemblyman?

ASSEMBLYMAN WOLFE: That's right.

SENATOR RICE: Okay. We expect teachers to respond.

Thank you for coming. This is a meeting of the Joint Committee on the Public Schools.

This morning we want to hear from those who are here. I'm going to turn this meeting over to Assemblywoman Voss and let her chair it. She is my Co-Chair. And I think we'll have the members say something before the presentation. I know that this is a subject that is very, very dear to Assemblywoman Mila Jasey. And I know she -- like Assemblywoman Voss, and Assemblyman Wolfe, and the rest of us -- goes up and down the state quite a bit listening to different aspects of education, visiting schools. And so every time we hear something we may not be as familiar with, we want to know more. There is a thirst for knowledge on this Committee, collectively and individually, and that's why we're assembled here this morning.

With that, let me turn it over to the Co-Chair, Assemblywoman Voss.

ASSEMBLYWOMAN JOAN M. VOSS (Co-Chair): Good morning.

I'm very happy. I read a little bit about what is going on. And having been an educator for more than 40 years -- and my dissertation was on the teaching and learning experience. So this is really something that I'm very interested in because I spent years and years researching.

And as the Co-Chair said, we travel around to all different schools. I've seen some wonderful schools, I've seen some terrible schools. And anything that we can do to make the teaching and learning experience better for our children is something that I certainly do applaud and encourage. And so I'm looking forward to hearing what you have to say this morning.

SENATOR RICE: I hope that this presentation doesn't disprove the theory of your dissertation. (laughter)

ASSEMBLYWOMAN VOSS: No way. (laughter)

SENATOR RICE: Assemblywoman.

ASSEMBLYWOMAN JASEY: Good morning.

And I want to apologize for starting late, but this is a tough time of year to get people. And in spite of the fact that everyone is not here, we record and transcribe everything that is said here, and it goes to the members of our Committee. So you will be on the record.

But having met Dr. Goodman and Dr. Knab some time ago, I thought it was really important to shine a light on the positive work being done at the Center for Teaching and Learning. And I happen to think that we're in the midst of education reform now nationally, and certainly here in New Jersey. But I believe that our educators have the answers that we

need. We simply need to give you the opportunity, the support, and the venue to pursue those solutions and then share them with your colleagues. So I hope that this is only the first of many hearings where we can give you an opportunity to share with us what you're doing. Because I know you're doing amazing work, but it's really hard to communicate the good news sometimes. You know, it's not a good sound byte, I guess.

So I am-- I really appreciate my colleagues coming this morning. And you're going to leave here feeling very positive and very excited about the possibilities.

So thank you so much for coming, and I'm looking forward to the presentation.

SENATOR RICE: Assemblywoman, one thing about this Committee: Any time we meet, we always leave feeling very excited. (laughter)

ASSEMBLYWOMAN JASEY: But positive.

SENATOR RICE: Oh, okay.

ASSEMBLYWOMAN JASEY: You're going to be positive today.

SENATOR RICE: Assemblyman.

ASSEMBLYMAN WOLFE: Yes, I'd like to thank both Chairmen and just say a few things that my colleagues have mentioned. This is a Committee that we have been appointed to, but I think all of us would volunteer for this because all of us have a background, in one way or another, in education -- either serving on school boards or teaching.

I personally was a professor of psychology for over 35 years, and I first started working with what used to be called *nontraditional* or *high-*

risk students. We keep changing the labels, but these are kids who probably should have done very well but had personal problems, home problems, drugs and alcohol, and ended up just basically getting through.

I started a program at Ocean County College that was a nontraditional -- it was a year-long college program that was judged to be one of the better programs in the country by a man by the name of John Roueche, who is still an expert in developmental education. So in addition to being a legislator, I do have a commitment to looking at the best practices. And it's nice to talk about education. I don't think we're going to be talking about money today. (laughter)

But really, I want to congratulate you. I know a little bit about some of the work you've done. And these are the kinds of things we need to get out to our colleagues in the Legislature. I had a discussion just before the meeting began about another issue that we had. We know about these things because we hear about them, but a lot of our colleagues don't know about them. And they only know what they've been told by the NJEA, or by principals and supervisors, or some other folks. And sometimes it's not really too supportive of some of the efforts to maintain the quality and look at some innovation.

So thank you very much.

ASSEMBLYWOMAN JASEY: And so with that, I'm going to turn this over to Dr. Goodman and Dr. Knab. And we might--

Can you guys all see the screen? (affirmative responses)

Okay, you're on.

R O S E M A R Y K N A B, Ph.D.: Okay.

Good morning, and thank you.

I am Rosemary Knab, and I am a trustee for the New Jersey Center for Teaching and Learning. And I am thrilled to be here today. This is a moment that's been a long time coming. You might think that we're actually here only to learn about PSI and PMI, and our science program. But we wanted this opportunity to thank you and recognize you for your leadership in having passed a piece of legislation two years ago that allowed us to create -- that allowed the State to create pilot programs and certification. As you will see as we move on, if it wasn't for you and your leadership, we would not have ramped up this program and expanded it the way that we have. So we're really here to recognize and thank you.

As you see, we're going to talk today about the Progressive Science Initiative and the Progressive Math Initiative. It's one of the new STEM initiatives in New Jersey. And not only is it a curriculum program for students, but it is a program that allows us to now certify science teachers and fill a critical void that we have not only in New Jersey, but in other states -- and around the world, I might add.

But first I just want to tell you a little bit about the Center. The Center for Teaching and Learning -- we started in 2007, and it was actually created and was the brain child of former NJEA President Joyce Powell. She said, "We would like to have an independent body, an independent foundation that would pursue some nontraditional ways to improve teaching and learning." I was fortunate enough to be working with Joyce Powell at that time. And we looked at what is out there now in terms of professional development, what are the opportunities that are available to teachers. I am actually a researcher at heart.

And what we decided -- what we noticed is that there are many opportunities out there for teachers to learn professional development, but few of them embraced a bottom-up mentality. For many years since No Child Left Behind was adopted on the Federal level, the message that came to teachers was, "You need to listen to people from the top down. We're going to tell you how to do your jobs, we're going to tell you how to make kids learn, we're going to tell you how to make education better." There were very few places, and foundations, and opportunities that would actually be founded on and embrace the idea that education needs to change from the bottom up, and not from the top down.

Therefore, our slogan, our mission for the Center is: Empowering Teachers to Lead Change. And you will see the programs that you see today have been designed, developed, refined by teachers. And our original goal was that we were going to make New Jersey lead the nation in terms of professional development and make that the best thing that could be out there, and people would look at New Jersey teachers as being the leaders in making change.

Well, you'll see that our story had to change, because suddenly we found that teachers from other states wanted to do what we were doing. And you'll hear today, in a little while, that now we also have teachers from around the world who are looking to us. So think about this: Two years ago you passed a bill, and here we are today thinking we would just change our little corner of the world, and we are changing the world.

Let me tell you a little bit about our Board. It is an independent Board, although we were created by the NJEA. Our Board has Joyce Powell, who is now on the NEA Executive Committee. So we have a

national perspective there. Our newest Board member is Dr. Eric First, and he is from Bayer Pharmaceutical. We're looking forward to him coming to his first Board meeting in a couple of weeks. Ross Danis -- you probably know him. He is on the -- he is the Executive Director of the Newark Educational Trust. I am on the Board. We also have two seats on the Board always for the NJEA President and the NJEA Executive Director. We are never the majority of the Board, but we will always have a presence on the Board. We have Rob Bonazzi, who is the President of Princeton Organizational Advisors. He works with companies around the United States. Dennis Bone -- you probably know him -- he is the President of Verizon. And Peggy Stewart is also on our Board. She is Chair of the New Jersey Professional Teaching Standards Board. So we have an eclectic Board. We envision our Board is going to grow. We're pursuing more businesspeople to be on it. And we will always be independent.

And now I'm going to turn it over to Bob in just a second, but I have the pleasure of really introducing Bob Goodman. Bob is not only the Director of the Center, but he is currently a teacher at Bergen County Technical High School, in Teterboro. He is the science chair and a teacher of physics, chemistry, and environmental science. Bob is also on the NEA Commission on Effective Teachers and Teaching. He is a Content Reviewer for Achieve, and he has also written a journal article for the American Association of Physics Teachers. And Bob also received the I CAN Learn-NEA Foundation Award for Teaching Excellence, and he was a finalist for the Horace Mann-NEA Foundation Award for Teaching Excellence. He is absolutely one of the most marvelous teachers that you have ever met. And by the way, he was the 2006 State Teacher of the Year.

But I think one of the pieces of Bob that most people don't recognize is that Bob didn't enter into education -- into the education field until 1999. So what was Bob doing with his life before then? Bob was actually in the business community. He was CEO for Harman Kardon, JBL Consumer Products, and Onkyo International Operations. So Bob had a whole career in business and industry -- that was very, very successful -- he sought before he chose to go into the teaching field. And so he brings that unique perspective that most people don't when they come into education. And I will say on behalf of the Board of Trustees that we are indeed fortunate to have him and his leadership as the Director of the Center for Teaching and Learning.

Thank you, Bob.

ROBERT GOODMAN, Ed.D.: Thank you, Rosemary.

And thank you for having us here today.

Something I would like to say at the beginning: First of all, thank you for the legislation that was passed two years ago. I think you'll be very happy with what we've done with our part of our work with that legislation.

Aside from what we're doing for New Jersey students, it's probably worth noting -- because I know Dennis Bone would say this if he was here today -- that a major benefit is accruing to New Jersey by the fact that this program is becoming world-known -- not only around the country, but around the world. I've now presented a version of this in Cape Town, South Africa. It's being adopted in Argentina as a way of training teachers. We presented it to all of the superintendents in Vermont, who are looking at it; Rhode Island. And as they're doing this, the phrase I'm hearing

repeated is -- they're trying to adopt the New Jersey approach to science and mathematics. So just like their Singapore math helped Singapore get a nice reputation, I know for us to compete globally it's nice that the world thinks of us as the place to go if you want to see science and mathematics. The fact that other countries are looking at this-- We just met with people yesterday who were thinking of the 54 African Union countries looking at this program now that they're getting fiber optic connections. So what you're going to see has been very well accepted by a lot of people. The beginning part of it was the basis of my dissertation from 2006, which--

I didn't cite you. I don't think I contradict you either though.
(laughter)

And then we're going to-- I'll explain-- It first explains what happened to get us to 2006, when I became State Teacher of the Year due to its results; then your legislation passed, which allowed us to move it to more schools and to bring it much more broadly. And then at the end of this, we're going to talk about-- We're going to have people come up who have been partners with us and have been affected -- either have caused this change or -- and/or -- probably both in most cases -- have been affected by this change.

SENATOR RICE: I have a question for you.

DR. GOODMAN: Sure.

SENATOR RICE: Now, none of this has anything to do with (indiscernible) International, or hedge fund people, or Eli Broad.

DR. GOODMAN: No.

SENATOR RICE: I just want to be clear. You see, once you say *international*, I get flashbacks of how we got in the mess we're in. It's

not about public schools -- I mean charter schools, it's not about all that privatization stuff. This is about public school teacher enhancement. Is that correct?

DR. GOODMAN: Yes, absolutely. And one of the things I'm told is unique--

SENATOR RICE: Because I will research you. (laughter) I'm being honest.

DR. GOODMAN: Well, if we have time at the end, at some point, I could-- From my business background, because I ran a business that was half-a-billion dollars--

SENATOR RICE: Well, so did those folks, and that's why I'm raising it. That's how they got started, and they still do.

But go ahead with your presentation. I just want to be clear for the record, I will run these names. I'm a former investigator. (laughter) I'm being honest. And I will make sure there are no hidden agendas or relationships, based on legislation we passed, to enhance those in our public school system.

DR. GOODMAN: That's fine.

Actually, the business principle -- there are business principles in here, but they're adopted by modern business practice, not the business practice that many of the organizations promoting business in education are endorsing. So you will find them quite different. This is really from the teachers up. Everything in this program is from teachers moving upwards, and nothing is from large organizations moving downwards.

The original founding idea of this project was based -- going back to 1999 -- was based on the fact that the U.S. has to become

competitive in mathematics and science. I think we all understand that. The two reports that are cited most often are “Rising Above the Gathering Storm,” which came out from the National Academies; and the “Perfect Storm,” (*sic*) which was, I believe, either funded or partly funded by ETS. And both of them documented the United States is having a serious problem and has a threat to its future if we don’t manage to reverse a trend downwards in mathematics and science achievement; or at least if we’re staying constant, the rest of the world is passing us by.

It was originally PSI -- the Progressive Science Initiative was initially developed to train high school science -- teach high school science to students. It was extended through the legislation done here to create new high school science teachers. And it’s now being extended to teach K-12 mathematics -- the same approach is. It was developed in one school from 1999 to the present. It is still there. PSI or PMI are now in more than 50 schools, and it’s extended to Argentina. We’re looking at Rhode Island. We just met with the DOE there. Vermont -- I just said. And we are training teachers in Argentina right now, which has two benefits: one is that we’re helping their teachers, but the other benefit is they’re translating all of our materials into Spanish and letting us post them for the free use of all students, including those in New Jersey.

This is the iconic graph that was the basis of a lot of work in my dissertation, and it’s the founding idea of this -- of what we’re doing. It shows the 1995 TIMSS results in physics. That’s the “Trends In Mathematics and Science Study.” And this only represents those countries that had more than 75 percent of their population take the test that year. So it rules out countries where they select who takes the test.

And the U.S. appears over here, you would say on the wrong side of this graph, as the weakest of these countries that were tested that way. But what was important was -- this was the problem that was demonstrated by this graphic. The solution can be seen in this green bar, which represents the disaggregated data of the students in the United States who took the AP Physics B exam and got a 1 or a 2, which means they're considered not passing it. Those students are actually competitive with the rest of the world. And more critically -- or perhaps as critically -- the students who got a 3, 4, or 5 -- that subgroup of American students actually outperform every country in the world. So when we set out to design this program in 1999, we said, "If we had a program that moved more of our students to take AP Physics B, and then more of those students to pass AP Physics B, we would be competitive in physics."

The other value of this-- That's why it helps us as a country. It also helps students because there is good research that shows that a student who takes an AP exam is more likely to get into college, graduate college, and get scholarship money than a student who doesn't. In fact, the difference between not taking an AP exam and taking an exam is greater than the difference between taking the exam and passing the exam. So if we can-- We can help our country by getting more students to take -- and hopefully the highest percentage possible to pass -- AP exams; we also help each individual student.

This is a snapshot of the 2010 results of the original site. This axis shows the number of AP exams taken that year in Bergen Tech, Teterboro. That's the school I teach in. And it shows 72 in 2010 were taken. There are 160 students roughly in each class in Bergen Tech -- each

grade. So that represents close to -- like 45 percent, something like that. The average for New Jersey is 2.5 percent of students in the state take AP Physics B. If 2.5 percent of the students in our school had taken AP Physics B, this green bar would represent what they would have done. So that's the norm. This blue bar is what was actually achieved. So it shows an order of magnitude improvement over what would have been expected for these students. And these are the other AP science exams. And you can see that all of them represent significant improvements over what would be expected. This is the results for having passed the AP Physics B exam, and you see similar gains. We never actually, by the way, compare these two and say, "What percentage of the students who took the exam passed it?" We really just look at, "What percentage of the students, before they graduate, take the exam," moving them to the center of that graph I showed you; and then, "What percentage of the students in the school pass the exam before they graduate," moving them to the far left. So we're looking for that constant progression.

I say that because, if you think about average scores, we have to be careful about unintended consequences. If we set up as our mission to get the highest average score, the easiest way to do that is to identify one student in the school to get a 5 and only let that one student take the exam. Then we could say we have a 100 percent pass rate, and the average score is 5. But that goes against our mission. Our mission is to get more students to take it and then more students to pass it. So we keep those data separate and we look to make each one of them the best it can be.

ASSEMBLYMAN WOLFE: Excuse me.

DR. GOODMAN: Yes.

ASSEMBLYMAN WOLFE: Can you go back to that?

DR. GOODMAN: Sure.

ASSEMBLYMAN WOLFE: On the left side -- the 40, 35, 30 -- is that percentage or are those gross numbers?

DR. GOODMAN: No, I'm sorry, that's actual number of AP exams.

ASSEMBLYMAN WOLFE: Okay.

DR. GOODMAN: Yes, this is actual numbers. Thirty-six students passed it in 2010 -- May of 2010. And we would have expected two or three students to pass it. I think 1.5 percent of New Jersey students pass the AP Physics B each year.

In my dissertation, I had to rule out alternative hypotheses. My dissertation was on documenting this program and its results. So there are 300 pages if you want to do deep research into where this came from. (laughter) There's extensive data on that; and there's much more data, than I'm showing here, about the free and reduced lunch, the demographic background of the students. I had to rule out eight possible alternative hypotheses that said that maybe the program wasn't having this effect, maybe something else was having this effect. And I think-- And my dissertation committee agreed that I had done that, although one of the results -- one of the conclusions that I reached was that in order to provide more evidence that this -- that the program was having its affect, it would have to be replicated in more schools to see if the same affect would be realized.

But if you look at this side, this is the SAT scores. And you can see, the blue is the State each year, and the green is the school's. And you

can see, all through this period it bounces around within a tenth of a standard deviation. The school is a pretty typical school. You wouldn't expect 25 times as many students to be taking and passing AP Physics B exams based on who the students are.

The methods that we use actually hit everything. I'd like to say that it's a complicated program, but no more complicated than it has to be to achieve very dramatic results. You're not going to find one simple answer to any major problem like in education. One thing that a lot of people focus on -- it's a key element -- it's not the only element, but a key element -- is the sequence of science that we teach. We teach physics to all 9th graders, and we feel that physics prepares students for chemistry. So they do-- Everyone takes the same physics course in 9th grade, then they move on to the same chemistry course in 10th grade. This physics course ends with what is the beginning of chemistry: quantum physics. It then moves on to chemistry. This chemistry course ends with organic chemistry and properties of water, which is the foundation for the beginning of biology. And biology starts with a puddle of water and some molecules and ends with life on Earth as we know it -- ends with me talking to you here today. (laughter)

So it's a very dramatic story. The students see it, the students understand the story line. And stories are important because if it makes sense, they remember it. If it doesn't make sense, they don't remember it.

ASSEMBLYMAN WOLFE: Excuse me, I have another question.

DR. GOODMAN: Yes.

ASSEMBLYMAN WOLFE: Under physics, you have the lines going down. Does that mean they're taking algebra and geometry at the same time, or they need to have had those before they--

DR. GOODMAN: Let me-- This is what the preengineering-- This started with the preengineering students in my vocational school and moved to all the students.

ASSEMBLYMAN WOLFE: Right.

DR. GOODMAN: Everyone is required to be taking algebra in 9th grade in our school. I was originally told everyone we had going to the school had taken algebra, but it turned out they actually couldn't do much algebra. So we end up reteaching most of them algebra. Some students elect to take a second math course -- geometry -- because they want to get to AP Calculus by the end. And if you start algebra only in 9th grade, you can't get to AP Calculus so easily. But some students come in actually having done algebra, in which case they don't have to take this course. But as you'll hear from me later, the second best predictor of whether a student will graduate college is whether they complete algebra by the end of 9th grade. So we hold very strongly that everyone has to be strong in algebra.

Does that answer your question?

ASSEMBLYMAN WOLFE: I'm startled by that last statement. But yes, thank you. (laughter) That's good.

ASSEMBLYWOMAN JASEY: Repeat that for him, because that's a key.

ASSEMBLYMAN WOLFE: Only for me though. (laughter)

ASSEMBLYWOMAN JASEY: No, no, I think it's a point worth spending a moment on, because it's a very important indicator. And

I can say that my interest in this really developed when we were looking at whether or not we actually have highly qualified, certified teachers of math and science in all of our classrooms. And that is an issue we've been debating. And I would say-- I only know anecdotally -- talking to teachers, particularly in our urban areas -- that that may not be the case, and yet we're holding students accountable for the material when, in fact, they haven't been taught the material in a way that they can understand it. So that's what intrigues me about what you've come up with here.

DR. GOODMAN: Right.

ASSEMBLYWOMAN VOSS: You come from a wonderful school. I'm very familiar with your school. And, of course, the orientation is towards mathematics. But you had mentioned -- and this is something that disturbs me -- that very often they will name a class pre-algebra or something, and they're not qualified at all to take algebra. But I'm just intrigued by the fact that some of the students can handle algebra and geometry simultaneously, because--

DR. GOODMAN: Let me say two things: One, I'm not sure if you're familiar with our school or our sister school, because that's a very common confusion.

ASSEMBLYWOMAN VOSS: No, Teterboro is in -- the kids are ready for--

DR. GOODMAN: Because we're a traditional vocational school. We teach fashion design, culinary. Our sister school is very strong in math and science, and that's the Bergen County Academies in Hackensack.

ASSEMBLYWOMAN VOSS: Yes, I know.

DR. GOODMAN: Okay.

ASSEMBLYWOMAN VOSS: That's where I live. (laughter)

ASSEMBLYMAN WOLFE: Getting back to your startling comment, you said if a student passes Algebra I in 9th grade, it's a predictor of success in college -- graduation?

DR. GOODMAN: Yes, ETS -- I can't remember her name--

DR. KNAB: Evelyn.

DR. GOODMAN: --was the first one to tell me this, and ETS has told me, and I've heard it several other times -- that the second best predictor of a student graduating college is completion of Algebra I by the end of 9th grade. Interestingly, the best predictor was whether their mother graduated college. But we can't control that when students come to our school. And so the piece we can control is whether they get a good algebra course.

And by the way, it actually makes some good sense, because if there-- It's a combination of cause and effect. It's partly, if they're good in math, they're probably going to be in an advanced math course and go on to graduate college. But also, if they don't take a good math course in 9th grade, they're probably going to be knocked out of good science courses and, later, good math courses. So it really limits them. And since such a high percentage of our students graduate high school and have to take remedial courses in community college--

ASSEMBLYWOMAN VOSS: Seventy percent.

DR. GOODMAN: Because in the math they're failing in the ACCUPLACER. When they go to community college it's typically Algebra

I or Arithmetic. It really doesn't bode well for them. I think the number is over 50 percent of the students who enter community college have to take--

ASSEMBLYWOMAN VOSS: Seventy.

DR. GOODMAN: What is it?

ASSEMBLYWOMAN VOSS: Seventy percent.

DR. GOODMAN: Yes, it's 70 percent or a very high percentage have to take a remedial course. And I believe only 5 percent of the students who have to take two or more remedial courses ever get any degree, even an associates degree. So it's pretty much saying, if they are put in remedial courses, they have a high likelihood of not graduating. And it's a pretty high likelihood they'll be in remedial courses if they're not doing the math -- the proper math in high school. And there is a problem with the level of mathematics being taught, especially in middle school, which I will get to soon, because middle school lays the basis for this. And you mentioned pre-algebra. There was a very strong tendency toward everyone wanting to say they were teaching Algebra I in 8th grade. But it turns out it's easier to change the name of a course to Algebra I than it is to teach Algebra I. So there are a lot of students-- We get students from 32 different middle schools, most of whom have Algebra I on their transcript, but about 60 percent or 70 percent of them, we find, can't do basic Algebra I.

SENATOR RICE: Before you go on -- because we don't want you to-- We don't mean to keep cutting you off, but--

DR. GOODMAN: No, it's okay.

SENATOR RICE: --this stuff is important to us.

The observation I've made for a number of years in the urban setting -- and we talk about remedial; we talk about passing math, and science, and all of these kinds of things -- isn't reflected there. And let me tell you what it is: If I understand you correctly, your program is geared toward training and enhancing teachers in the science and math area. Well, I'm just a firm believer that if you don't learn how to read for comprehension, that stuff doesn't work. So why would you develop a program from our legislation that didn't make reading a priority to whatever else you're doing simultaneously? Because I can tell you right now -- I don't know how much urban experience you have, but I have all my life worth. And I'm telling you, when we can't read for comprehension and understanding, the other stuff doesn't work. We get through it because we kind of memorize the steps. In geometry there are theorems.

Now, I was a good student and all that stuff because I had to be. The kind of parents I had, if you didn't get a good grade-- But I thought I was being slick, because I did very well in algebra. So when I got to geometry, I didn't read all that at the beginning. I just did the stuff they showed me how to do. Then, when I got to the middle, I couldn't figure out anything because I realized I had to -- I needed some theorems, so I had to go back. But it's the reading piece.

Where are we in that scenario, or do you not care about that? Are these for all-- Is this enhancement for teachers to deal with any level of student, or these are your selective science high school types of students? I mean, I need to know this. It sounds good, but it seems to me something is missing. I don't see how this can be as successful as you say it's going to be

without us carving out those who can read for comprehension. And that's going to be a select group.

ASSEMBLYWOMAN JASEY: Senator, if I may, two things: One, the legislation that you're referring to (indiscernible) teachers, which was to address the need for teachers in these areas, but also to create jobs for New Jersey residents who had lost their jobs in the recession.

SENATOR RICE: Right.

ASSEMBLYWOMAN JASEY: And I think-- And these-- I think if we let Dr. Goodman finish, we'll understand that he's talking about all students, not just students who are particularly interested in math or science.

And perhaps we should let you finish and then ask our questions, is what I'm trying to say.

SENATOR RICE: And we'll do that. But I'm not going to be that impressed on the experiment of a small group for now that is not longitudinal, with the understanding that one of the most important elements of this experimentation, from my perspective -- and I'm not a rocket scientist -- is reading. So I need to put that on the record. I don't care what kind of background you have in education, how many boards you've been on. I'm not stupid. If it isn't reading, it isn't going to work.

DR. GOODMAN: And we're very comfortable with that. And we set out, based on the legislation, on mathematics and science. And you will find, I think -- I don't know if it's in this very well -- but we do address reading a lot in the physics program, because physics involves a lot of reading for comprehension. But keep in mind, this started as a high school program. It has moved to many schools, and we'll present data about urban

schools that are moving very -- hitting very high levels of achievement. We have been asked though, by many of those urban schools, if we would develop for them a similar program for literacy, social studies, history, global studies. So there is the opportunity to do that. But we started with our central core, and we're spreading out to more different types of schools and to more subject areas. But this is where we started.

So the physics goes along this way. One thing we do is, we avoid tracking by having -- encouraging all students to go on from physics to AP Physics, which they take the same time as chemistry; and these are the AP courses; and then the math flows this way. The nice thing is that all the courses lead from one to the other, which makes it comprehensible to students. If you don't do it that way-- If you take the APs out, it still works. It flows very nicely. And here is just taking algebra alone. It shows you could do it either way.

This is what our current system does. Where biology is taught without a background in physics or chemistry -- so you're left with memorizing and description -- very much like you're describing, having to memorize things rather than reason through why this must be based on what you learned before. You're just memorizing things here. Chemistry doesn't follow from biology, so it's more memorizing. And physics doesn't follow from chemistry or biology, so there are no arrows connecting these. And also, biology doesn't give a venue in which students can practice the use of algebra. So many students, through algebra, are saying, "When am I ever going to use this?" because they have no application.

The pedagogy is social constructivism, plus direct instruction. So the students are seated at round tables. This one is from Newark

Technology High, where this program is being implemented. And you're going to hear from the Principal and a teacher from Newark Technology High soon about how it's affected their results. They sit around round tables, they do group problem solving. It's heterogeneous, so one student may be very strong at mathematics, someone else may be weak at mathematics, but they're all studying physics for the first time. We use direct instruction because they do need to be taught the material of science. You can't expect students to discover 2,000 years of western science on their own in 180 days. So they're taught, but they go back and forth between being taught something for 5 or 10 minutes, and then practicing with their friends, talking about it, and using social constructivism discussion to incorporate that knowledge into their own understanding.

We use a lot of formative assessment. This is a SMART Responder. It's about this big. Students hold them in their hands. And we're doing anonymous student polling constantly through the class. So if the students get lost, we find them within 5 or 10 minutes. We don't wait until the end of the week or the end of the month to find them. An example is: For instance, this is how you might teach decimals -- how to add decimals. This slide at the bottom, below the green line, might be the instructions of how you would add decimal numbers together. It's in a SMART Notebook, which means that it's easily shared between many teachers. So there are the instructions.

This would be an example. The teacher would take 5 or 10 minutes to go -- to explain those two slides; but then, without spending too much time on it, go directly into this question which would appear. So the teacher doesn't have to think of doing it. This is all prepared in advance of

the class. And the students put their answers into their Responder. When the question has stopped, you get a graph out. It doesn't tell the students which is the right answer at this point. It just tells them what all the people in the class think the answer is. If they all have the same answer, and the teacher knows it's right, they can actually just try one more question, or maybe just skip to the next topic to teach the students so they don't sit there and get bored. On the other hand, if they're all wrong, the teacher could reteach it. But if it's like this, where some are right and some are wrong, you ask them to talk about it around their tables -- people with different answers -- to explain to each other why they're right. And through that social constructivist environment, they figure out the right answer on their own. You repoll them, see if they have the right answer, then repeat the cycle. It's like a Socratic method where most of the instruction is "why" questioning and the students responding. Very little of it is through lecture.

We do grading -- summative assessment. The grades are based only on what students know and can do -- tests, quizzes, labs. We allow students, they're not happy with their grade, to retake any of their assessments. We have multiple versions posted. We only take the highest grade, so if they didn't do well or they feel like they could do better -- if they want to go back and study with a friend and try again, they can take a new version to raise their grade. But there is no subjectivity to the grade. You can't raise your grade by having the teacher like you or by turning in homework assignments, because we think of homework assignments as a means to understanding, not evidence of understanding. And the students are able to follow their own path to learn the material.

But in the end, our results in all of our tests correlate to end-of-course tests -- either the AP exams that we work with in science or in calculus. The end-of-course Algebra I test from Achieve is what we correlated our pre-algebra and algebra to. And we are now developing common core mathematics which, when the assessments come out, we will align to those. We should be able to predict with good dependability what the student is going to get on the end-of-course test before they get to that test because they've been taking exams just like that, and their grade is based on that.

In Rhode Island, the 2006 State Teacher of the Year and I were talking, and she was talking about how, in her math department, teachers were always wondering how kids could get to Algebra II and seem to know so little Algebra I. And she sat with them and said, "Well, let's look at the math. In our school you're giving 30 percent of the grade based on homework, participation, and being nice," or whatever you want to call it. That means students can get 40 percent correct on all their tests and get a C in the course, and that's what's happening in a lot of schools. We very much believe that grades should only be based on what students can demonstrate they know and can do.

The technology you need to implement this program is a SMART Board. Everything is based on SMART Board instruction -- not so much because of the technology, but because the technology allows teachers around the world to develop and improve units of instruction and share them with each other. We now have over 5,000 teachers sharing materials back and forth and continuously improving them. With electronic digital formats, that's very important. When I came back from Toronto-- Some of

the countries I was talking to -- Brazil, Argentina -- are giving away millions of laptops to their students right now, and the thing they're thirsting for is digital content. They were very happy to see there is digital content.

But this is where your legislation came in. Everything I talked about, up to now, you would be correct in saying was originally based on one school. When I was 2006 State Teacher of the Year, the Commissioner and others asked me to go talk to Abbott districts and others about implementing this program to improve their results, but there was a problem, which is: All of our -- this is before we had SMART Boards, so there were no SMART Notebooks to send instruction materials to other schools, and there was a shortage of physics and chemistry teachers. So a program based on teaching everyone physics couldn't work. So your legislation in the spring of 2009 authorized pilot programs to create new science and mathematics teachers, and that opened a pathway for us to create the teachers these districts would need to realize the same results we had done in this one school. And we used the approach that-- We had shown that all students can learn science, and we don't think any-- If students can all learn science, there's no reason the teachers can't learn science. And our goal was to teach skilled teachers science to create skilled science teachers. I'm told, having done this presentation many times, that this has never been done anywhere else, and it seems like a simple-enough idea, but it's an important idea. And one of our premises is that teaching is hard, science is easy. We could teach science to anyone, but there are a lot of people it is very difficult to create -- to make into great teachers.

Kean University -- who will be speaking to you after this part of the presentation is done -- and the Center for Teaching and Learning

teamed up to create coursework -- graduate credit coursework. And we teach the science -- the science concept to teachers exactly the way we would like them to teach it to students. The teachers sit around round tables, take the same quizzes, take the same retakes, do the same formative assessment for 120 hours in the summer. After that 120 hours, the pilot program authorizes them to teach that single course in their schools. While they're teaching that course, they have 240 more hours of coursework where they meet two-and-a-half hours one night a week and six hours every third Saturday, from September through June, to learn AP Physics B-level physics -- so higher-level physics -- and meet with their cohort to talk about how they're teaching of the first-year course is going.

The results, which are very important to all of this, are shown in this first bar. This is the group that graduated last June. There were -- 42 teachers began the program; 3 dropped out for personal reasons, leaving 39; of the 39, 8 were already certified teachers. All these teachers were in Paterson, Newark, and Jersey City, so they were all in urban schools. That left 31 teachers who were not certified when they began the program. Of those 31, as of last night, 20 have passed the Praxis and are now highly qualified, by Federal standards, and have been given paperwork to be certified New Jersey teachers. Eleven still have to pass the Praxis, so they have a little more time to do that. We're hoping that they do. There are some different reasons. But it's worth noting that this bar is the average of all the New Jersey universities. This doesn't include alternate route; I don't have those numbers. But this is -- all the universities in New Jersey combined have produced about eight physics teachers a year, as of when the program started. But New Jersey actually looks quite good, because North

Carolina, Georgia, Ohio, Massachusetts, and Delaware are also shown here. I can add Rhode Island. I was just meeting with their department of education, and they told me the University of Rhode Island created no new physics teachers last year, so that's zero. And they think it was true in Vermont, but they're checking for me. Everything here is based on conversations with people. So I've talked to the person in Georgia. They went from one to two teachers a year over the last few years. So this result is very dramatic, and it's why all these states and countries want to talk to us -- because they have the same shortage that we do and the same problem that we do.

And by the way, if you -- I think we all care about our country. This part of the graph over here portends a very poor future for our country. Because if we can't create physics teachers anymore, and if physics is the foundation for science and engineering -- a key foundational course -- we're going to just find ourselves without a program like this. We're going to find ourselves having less and less teachers who can teach our students. Therefore, it's a downward spiral, and I think this is actually well into the downward spiral. There just aren't teachers being created to create the students to go to the universities to become teachers. We're breaking that downward spiral with this program.

We have 60 more teachers who are graduating right now from the program; 20 finished chemistry a couple weeks ago, 40 more are finishing physics in the next few weeks. They're from six school districts, 35 schools, and they're teaching about 4,000 students physics and chemistry. And we'll get numbers on that. But we're impacting a lot of students' lives already.

This is Newark physics teachers. Newark, when we began the program, had 14 physics teachers for 40,000 students. Most of those were in Science Park High School, leaving probably seven or eight physics teachers for 39,000 students. It's simply not enough. They had never had a student pass the AP Physics B exam in the history of their district. And what we did was, by the end of our first year we had gotten up to 25 physics teachers. They now have 39 physics teachers. We estimate, based on our calculations, 56 physics teachers would suffice to teach all the students in Newark physics. So they're well on their way toward achieving this.

And I'm going to introduce Tim Panebianco, who is going to go through this data with you.

But specifically to your question of going outside of a few schools: This is results that are already being realized. It's important to keep in mind that our big measure is getting students to take AP Physics in the -- first AP Physics, then AP Chemistry. But it takes five years from when we start before the last student -- the students have taken that last AP exam. So it takes years for this to roll out. And one of the things we have to remember in education is to stay on the same track for years in a row if we're going to see real gains. These are the first results coming in from schools in the districts we started with.

Tim.

TIMOTHY PANEBIANCO: Thank you for the introduction, Bob.

SENATOR RICE: Before the gentleman comes on, let me just say that -- and I keep going back to this reading scenario, and maybe it's

something we need to be talking about. If, in fact, they are getting requests to have a literacy program, maybe we should think about legislating that we have to have it. We don't have the luxury of time for an organization of this caliber -- if, in fact, this stuff is valid, and I don't believe it's not at this point -- to be thinking about it. Because I'm telling you, I know from experience that reading-- People don't go into certain areas or fields -- and I was one of them. My brother is a veterinarian. He wanted to be a medical doctor. He liked animals, so he went to a school -- Tuskegee, where they have both. But the point is that we grew up and I was better in science than my brother. The difference is, I was memorizing stuff because all these Latin derivations -- it just doesn't stick with me. So there was a fear -- if you understand -- from reading; that I wasn't probably taught to read the way I should be reading stuff. I was memorizing. The same thing when it comes to fixing things. If you show me, I'm okay; but if you give me schematics, I just fall apart and say, "I can't read this stuff." You give me all this IT stuff, I get a cell phone, they give me a book, I think I'm going to do something basic, and I'm reading this stuff, and I'm like, "What the heck are they talking about?" So to me it's the fear that people never want to talk about that's real out there with a great number of students. And so if they want to teach, they shy away from certain areas. It's easier to remember history than it is to remember something about chemistry. I forgot all the chemistry, I forgot all the physics, I forgot all the algebra. I have. I couldn't pass the test today.

So I just want to emphasize that for the Committee, because we're going to be rolling out -- and I will get back to the Committee on that soon, because one of the things-- I might as well just say it now to the

members: I'm going to be setting up a series of meetings. We're going to be going to counties and hearing from superintendents, because I want to know where the Abbott money -- district -- is going in terms of those schools. We fight for the money. I don't have a problem with that. But now we need accountability. And so this is good -- this presentation -- because it kind of gives us some food for thought when we start talking to superintendents about what is happening.

DR. GOODMAN: We agree with you. I was just recently presenting this to the Newark Alliance, and there was talk there -- the Department of Labor; Verizon, which is very involved in literacy; and some others -- to address literacy. And we said that we think that's the next thing we would go into -- is reading, literacy, because-- And we've been asked that now by Pemberton, Newark, and others. So we think we have a methodology that would apply there. It's just that we've been moving as fast as we can. And until three months ago, there were two full-time employees doing all of this, and now Peggy Stewart -- who you will see soon -- has joined us. So we've been pedaling as fast as we can. As soon as we get the mathematics done, which is just a natural flow from the science-- But people do say to us, "The next thing to improve, even our science, is to improve reading," because you have to read in order to do science, or mathematics, or anything else. So we have no problem with going in that direction.

ASSEMBLYWOMAN JASEY: Right. And I think the point here -- and I think what the Senator is getting at -- is that the methodology-- One of the things that we ask about all the time when we hear about any success in education is, "Can we replicate it? Can we take it

from here to every other district?” And I think what’s so exciting about this program is that, not only have you exponentially increased the number of physics teachers and chemistry, but it’s a methodology that clearly can be applied to all subject areas. And what we’re talking about is: How do we meet the tremendous need for highly qualified, competent, capable teachers so that all of our students have access to them? And that’s what I find so exciting about this.

ASSEMBLYMAN WOLFE: Before you go on, I also have a question. When you began your presentation, you showed that chart, and I asked you the question about the numbers -- 35, 30 -- and you said those were individuals. Now, the students who were taking these courses, are they-- They’re in a vocational school?

DR. GOODMAN: They’re vocational students.

ASSEMBLYMAN WOLFE: And they’re going to be what? What are they gearing towards?

DR. GOODMAN: Well, it really varies. You know, in modern vocational schools, a lot of students go to college from them at this point, as opposed to going directly into the workforce.

ASSEMBLYMAN WOLFE: So they’re not all going into engineering, they’re just--

DR. GOODMAN: Well, we’ve been asked that recently. And we’re thinking one of our next projects -- we have so many projects -- but one of our next projects is to do a longitudinal study. A lot of our students have gone into engineering. Students who came into all different fields-- I know we have four students now at MIT, we have students at Harvard,

Brown. We had six students last year, I believe, who went into Cornell Engineering, Stevens. So a lot do go into engineering.

ASSEMBLYMAN WOLFE: These could be students taking culinary arts and auto body?

DR. GOODMAN: Could be. It's actually kind of a cool feeling when I'm walking out after doing an AP class and one of my students is offering to sell me a pecan pie he just baked. So that's actually not unusual. These are students from all different areas. Right now -- not at this point -- not cosmetology because it's moved to a different campus -- but cosmetology students, all students -- auto.

ASSEMBLYMAN WOLFE: Okay. Thank you.

MR. PANEBIANCO: So I'm happy to share with you some results we've had with the other schools outside of Teterboro, and I will show you Teterboro's results as well. What you see appear right now is a measure of the AP Physics B participation rates. As Bob set up for me a few minutes ago, the iconic slide he shared with you on the TIMSS study -- our goals are to move students up the graph by getting them to take AP Physics B, and then pass. Since we started, in 2009, training teachers, we ran through one full year with that first group teaching students in 9th grade physics. And this year, in the spring of 2011, those students -- some of them moved on to take AP Physics B and took the test within the last few weeks. So we're starting to get some results, and I'm going to show you a little bit about that.

Using publicly available data via the New Jersey School Report Card, I was able to benchmark where schools in the state were in regards to one another in terms of AP Physics B participation. And I define that as

the number of students taking AP Physics B in the school divided by the total enrollment of the school. And this would give you a measure of how many students would be predicted to take AP Physics B before leaving the school.

So if you look along the left side here, this is the ranking of the schools. I haven't listed out all 135 schools or more that are doing AP Physics B, but I did want to give you a snapshot of the top. The schools that are highlighted are schools that are doing PSI. And in particular, what I have done is -- these are color-coded by districts we've been working with. Green is Bergen Tech Teterboro; the light blue is Jersey City schools; the red, Newark public schools; and the purple, which you can see at the bottom with Paterson Academies, that is the Paterson district.

So in the first year of the program -- this is just a snapshot of where they were before they really started getting students into AP Physics B. As you move over into the second column, this year-- I'm assuming that all of the other schools will remain static in their performance, since that data is not currently available. But when we polled the schools this year to see how many students were taking the test, we were able to find these numbers. Last year, Bergen Tech Teterboro was at 46.9 percent. They had some modest growth up to 48.2. They are number one in the state as far as participation. Technology High School in Newark, who you will be hearing from in a few short minutes, are at 8.6 percent, ranking about 16 in the state. This year, they're teaching, I think, around 78 students AP Physics B, bringing them up to 34.1 percent, number two in the state, as far as AP Physics B participation. McNair went from 11.1 to 23.4, making them number three. Also very impressive is Paterson Academies, which there are

several buildings that participate. They implement it across several of them, but not all of them. Just with a few of those subbuildings implemented, they went from being not on this chart, at zero percent, to having 15 percent enrollment in AP Physics B this year, and those kids took the test. That makes them number nine in the state.

And looking forward to next year, we have some schools that did join us this year, so they would have been teaching physics to their 9th graders. Based on their predicted enrollments, I have some numbers here on the right side that show what their performance will look like. For instance, Bergenfield High School, which previously did not teach AP Physics B, is now going to be teaching about 12.9 percent of its class -- its enrollment AP Physics B. Liberty High School, similarly-- While they did implement the first year and did not schedule this year, they will be at 16.7 percent enrollment, which is a huge jump for them as well. But also very impressive are the three schools here at the bottom: Arts High School, in Newark; Malcolm X. Shabazz High School, in Newark; and Newark Vocational High School, in Newark all had zero percent enrollment in AP Physics B in the past. Next year, based on what we know, they will also be in the top 10. Arts High School is looking at about 70 students between two grades who will be enrolled in AP Physics B, and Malcolm X. Shabazz will be at 17.2 percent. And these are fabulous results we hope we can replicate in more schools.

What I'm not showing here are the other schools, since there are about 150 schools doing AP Physics in New Jersey. I couldn't fit them all on one slide.

SENATOR RICE: Let me ask you a question, because I have a personal interest not just in Newark schools, but Malcolm X. Shabazz, which, when I attended it, was South Side High -- and it was one of the best schools around pretty much in everything. And pretty much all of my classmates did very well, from aviation, to me coming down and beating up on governors, to whatever. (laughter)

But all of a sudden, Malcolm X. Shabazz just keeps slapping me in my face with every kind of problem you can think about. That's all I read about. When they talk about Newark (indiscernible) from the high school, it's always Malcolm X. Shabazz. I don't know what we're doing there. This number -- because I was looking there and saying, "Wait, where is this 1 percent?" You're saying that the 17 percent, or whatever it is, is going to be enrollment in a program? That's what that means?

MR. PANEBIANCO: That would be the number of students taking AP Physics B next year in the school.

SENATOR RICE: Seventeen people, students--

DR. GOODMAN: Percentage.

MR. PANEBIANCO: Percent.

SENATOR RICE: --or 17 percent of the student population in that--

MR. PANEBIANCO: Percentage of the population of the school.

ASSEMBLYWOMAN VOSS: Of the whole school.

MR. PANEBIANCO: Of the whole school, yes. Absolutely. So it's 17 percent of the whole school.

DR. GOODMAN: Seventeen percent of that grade. So if they did that for four years, it would be the whole school.

SENATOR RICE: It would be the grade.

ASSEMBLYWOMAN JASEY: So they have to have completed Physics I.

SENATOR RICE: And that starts when?

MR. PANEBIANCO: That will be -- next year they will be taking AP Physics B. This year they taught it to, I believe, nearly every freshman in the school -- they taught physics. Now, next year is the second year of the program for those students. They now have the opportunity to take the AP course, and that's what their enrollment will look like if they do complete the scheduling.

DR. GOODMAN: Just to clarify, it's 17 percent of the 9th graders who took the physics this year or signed up for AP Physics B next year. So if they continued in that same way, it would be 17 percent of all graduates. But you can't -- it takes four years to have all of them go through the program. Just to be clear.

SENATOR RICE: So that's it. So there is a way for me to find out how well they did.

DR. GOODMAN: Yes, sir.

SENATOR RICE: I need to know that. Do you have that information?

MR. PANEBIANCO: At this point they're not enrolled in AP Physics B yet.

SENATOR RICE: But you said they took physics already.

MR. PANEBIANCO: They took the first year of physics, which is not the AP.

SENATOR RICE: Well, doesn't that first year have an impact on how you're going to move into the next? Do you understand what I'm saying?

MR. PANEBIANCO: Oh, most certainly.

SENATOR RICE: There's a relationship there. See, I told you I went to school there. I understand correlations and all that stuff. There is a direct relationship to that. That's what I'm trying to get at. I want to go in and say-- I want to go in there and just get on somebody's case. "You did this. How did we do? Why not? Where are we going? Congratulations. About time." I need information that you may have surrounding those schools. And that's all of them really. We need to know what-- I need clarity on what it means that you're taking physics now. Because I'm getting the impression like nobody ever took physics or nobody wanted to take physics, and you encouraged them to take it. Well, fine, you encouraged me to go into a class. But did I pass it? But did I pass it based on knowledge, comprehension, and understanding? If that's the case, then I know we're moving to, like you say, AP. I need to look at that first part. So if you could help us out, through the Chair, and get us information or tell us where to look as it relates to all the schools, then we would know how to question these individuals when they come in; we'll know how to question the superintendents when we start talking about the summer meetings, when we go county-to-county to talk about how we're spending money in those districts. Most of those are SDA districts. Do you

understand what I'm saying? It may also enhance your growth and opportunity once we determine need.

DR. GOODMAN: I'm sure we can get data for you on that specific school. I will say -- I don't think it's in this presentation -- but in Newark, overall, I can tell you that out of the 2,000 9th graders in Newark, 300 of them took PSI physics last year -- that's last year. And of those-- Those 300 students scored about 44 points, 14 percent, better on the Algebra I end-of-course test that was given last May than the students who didn't. So there was a gain already in many of the students' math scores. But the specifics of Malcolm X. Shabazz -- we'd have to talk to the Principal or the central office there. The data we're gathering is much more simple than that, because we're just getting how many students they are scheduling for the AP Physics B next year and how many students were in 9th grade this year. So it's easy for us to get the other data. We can get it, but it will take a little more investigation.

SENATOR RICE: My concern -- and I'm going to let you go on with your presentation -- from a Chair perspective, for the Committee members, is that we've traveled enough, and we've interacted with enough academicians, and students, and parents, that we know -- understand, statutorily, we have to oversee what is known as the *Abbott/SDA districts*. So even though it's your larger universe, we have to pay particular attention to those districts that we are funding and talking about parity. The money is not the issue anymore, because we'll fight to keep money. But we can't fight for money. We have to fight for accountability. The problem that we're having is that our Committee, individually and collectively, is up against the media that keeps spinning that nothing good is happening out

there. And we know that's not true, because we're visiting the schools, talking to the students, talking to people, and we don't get that side. And then we'll take a percentage of 44 and make it a negative by saying it's below 50 percent, when it's really a positive, because it's above 5 percent. Do you know what I'm saying? And so we need information where we can start to defend what we're doing from an oversight perspective; and our position on progress versus no progress, versus the need for more progress. And that's why it's important that we have these presentations. And you made me feel a lot better today that there is some -- we're not totally wrong on this Committee, that we do see some progress. (laughter)

MR. PANEBIANCO: Well, I'm also happy to tell you that very shortly the schools who participated in AP this year, that you see on this chart, will have results that we can measure and share.

And I did want to highlight one thing, which-- If you take a look at this graph right here again -- same picture, just highlighted differently, these two schools -- Malcolm X. Shabazz and Newark Vocational -- are recipients of school improvement grants. So we can-- This has been shown to be effective now, we hope, in these two schools. And there are many other school improvement grant recipients on this list, and they are growing. East Side High School in Paterson, and I forget the other one off the top of my head--

SENATOR RICE: Are there any South Jersey schools on that list? I can hardly see. South Jersey, like Gloucester County or some place in that area?

MR. PANEBIANCO: As far as PSI implementation?

SENATOR RICE: Yes.

ASSEMBLYWOMAN VOSS: Camden.

MR. PANEBIANCO: We haven't reached down to the South yet. We are starting a southern expansion this summer and hoping that some schools will take advantage of the training we're offering in Moorestown. But we would love to start working in the South.

DR. GOODMAN: We started within driving distance of Teterboro. But if you could introduce us to people within South and Central Jersey who would like to have much improved science and mathematics results, we'd appreciate it.

SENATOR RICE: One of our members, Norcross.

MR. PANEBIANCO: I did want to just also tell one other thing on this topic, which is-- To keep it in perspective, if you look at the math SAT scores for these schools, I think you'd also be impressed. Earlier Bob showed you about Teterboro. Well, Teterboro, in this graph, is just to the right, in 2010, of the state, just a little bit above. If you look at the schools that are performing on that chart before, these are schools that range from the mid-300s to just below the state. So they're doing much -- they're doing a lot with the program. And it's also interesting to see that a school with such a high math SAT score did not perform as well, necessarily, as these other schools did this year. So it's an interesting result I just wanted to share with you.

DR. GOODMAN: When we met with Jersey City, Paterson, and Newark superintendents a couple of years ago, one of the things that we told them was our hope and goal was to have them have the best science programs in the state, not the best science programs in the urban schools in the state. Our goal was to surpass the affluent, suburban schools. And

what you actually see in that graph -- you're seeing urban schools with demographics that would say they shouldn't be able to outperform the affluent suburbs, but they're actually outperforming the affluent suburbs.

SENATOR RICE: Don't tell anybody, because 101.5 is going to disagree with you. (laughter)

MR. PANEBIANCO: I did want to switch gears just for a moment though and talk a little bit about the content that these teachers are using. We host all of the course materials. Everything you would need to teach the course is actually out on our website available for free to teachers. So any teacher can sign up and get access to everything, including the assessments. Students can get access to everything but the assessments. You will be happy to know that.

This is a snapshot of our site. And as you can see, this is just the science. You can see the science courses: the Physics, the APs, the Chemistry, the AP Chemistry, and the Biology. This is-- If you click on one of those courses, you would see the list of units available, so a full year of course work. And then if you click within one of those units, this is what a teacher would have access to. So ranging from handouts, to a SMART Notebook presentation that-- It's not a unit plan, it's the actual unit they would use to teach, with the imbedded formative assessment. We have many -- a few different presentations sometimes for each unit. There are always homework problems, solutions; we have labs; an actual unit plan. Some people still like to have a unit plan -- that's important for pacing purposes. And the assessments -- you don't even see the assessments here, but we have at least one retake for every assessment, and there are numerous assessments in every single unit -- so quizzes and tests.

And this is the front page of our website, which if any teacher would want to go and register today, they would just go log in at the top right, and within 48 hours they'll get access to the site, pending their review.

And just to highlight something Bob said before, we are getting about 50,000 page hits per month from around the world. Almost every continent is represented, and there are about 5,000 unique visitors every month. We suspect most of those are teachers. And because this is an open-source approach, we are getting feedback from those teachers on how we can enhance our lessons. So when they come up with a better way to explain something, they send it back to us and then we post it. So when you go out and look at our materials later, you can see we have different version numbers, and we keep increasing that version number every time we get additional feedback.

And in order to make that happen, since we are working around the world, we utilize all these different technologies. So we get responses on Facebook, text messaging, IM'ing, Google groups, e-mail, everything you can name. And that's how we're also working with the teachers we're training.

And at this point, I'd like to introduce Peggy Stewart.

P E G G Y S T E W A R T: Hi, good morning. It's a pleasure to be here.

I'm a classroom teacher, so I have not had many opportunities to come before a group like this, so I really appreciate the honor.

I take a little bit different approach in this presentation. I have no statistics for you, no big numbers for you to look at. (laughter) But I would like to share-- In the news, we've had so much written about the

great work that both of my colleagues, Dr. Goodman and Timothy Panebianco, just shared with you about the structure, scope, and sequence of the program. And there has been much written on this.

Bob, can you advance? (referring to slide)

I would like to share with you another perspective. You've heard a lot about the content itself, but I'd like to share the professional development part. I Chair the New Jersey Professional Teaching Standards Board, and have for the past six years, and professional development and really good teacher training is very important to me. And you might be familiar with Learning Forward. Learning Forward is a professional development organization in the United States. It used to be called National Staff Development Council. And they've done tremendous work in looking at what works with professional development and what doesn't. What are the really best things that could happen to make teachers the best that they could be and the most effective?

Well, Learning Forward worked with Linda Darling-Hammond, a famous researcher in that field as well, along with Dan Mindich, one of her colleagues out of Stanford University. And they did professional development studies for three years in a row. And the first two years looked at: What makes good professional development? And then: Where do we see it happening? What's going on in the nation?

And after those first two years, when they identified what works, they looked at some professionally active -- professional development active states, and they highlighted four states in the nation that have been doing really great things in the area of professional development. And those four states were the focus for their third year of this study, and New Jersey

is one of those four states. I think you should be aware of that as well. We've done great work in this state, from the Professional Teaching Standards Board, in working with: How do you get teachers really prepared? And it deals a lot with our Center's philosophy that Dr. Knab introduced you to -- like, how do you empower teachers to lead school change? So they looked at New Jersey -- the other three states were Colorado, Vermont, and Missouri. And they said that all four of these states were really active. So what does New Jersey do that's working, and how do we even advance it from there? And one of the things they liked was that we had a plan where we all networked in many ways. And the example they looked at was how the Center for Teaching and Learning worked with Kean University in partnering for this endorsement program, and how they worked with the DOE to enact some of these things.

So in this final -- third -- would you advance for me, Bob? -- third phase of this report, they noted that the Center for Teaching and Learning has been doing ground-breaking professional development. And by the way, the entire report can be found on the Learning Forward website, and there is also a link from our website that gives you more ideas of what they looked at. But they really found that the work that we were doing, through the legislation that we've been given on teacher endorsement and teacher training, has been really great.

And I'd like to draw your attention to another point on that. One of the key features of professional development -- how do you determine if it's effective -- is: Is it impacting student learning? So when you really brought it back, the idea that we've had such great results with

both teacher training, and then also the student learning, is something that they looked at.

Bob.

That brings me to the other point that I think is really -- we've been talking a lot about. A couple of months ago, we were nominated -- the Center for Teaching and Learning was nominated as a finalist. There were 14 finalists worldwide in a global competition. It's called the IMS Global Conference, and it stands for Instructional Management Systems, but they don't really even use that term anymore. They just call it the IMS Global. It's a global organization that looks at: How do we get really high-quality educational materials? How do we get access? How do we make them affordable to a broad group of people? How do we hit our urban areas? How do we hit our rural areas? How do we really get this great stuff accessible and affordable?

So we were one of four programs chosen from the United States, and the other 10 groups came from South Korea, Taiwan, all over the world -- Australia. And just last week Dr. Knab and I went out for the final round in this award, and we were given the Gold Award. So the New Jersey Center for Teaching and Learning has been recognized as a Gold Award winner. And it was for the impact that we have had on our students. And they particularly, by the way, looked at the impact we've had in the urban areas, which are sometimes so challenging around the world, regardless of where you are.

So we've been doing some great things since this new legislation has gone through, and I get to present the highlights to you on that end of it.

Thank you.

ASSEMBLYMAN WOLFE: Can I ask a question?

ASSEMBLYWOMAN VOSS: Yes.

ASSEMBLYMAN WOLFE: I want to apologize for a statement I made at the opening. I think I kind of beat up on NJEA. So I guess this is an NJEA project -- this whole presentation?

ASSEMBLYWOMAN JASEY: The Center.

ASSEMBLYMAN WOLFE: The Center.

DR. GOODMAN: Well, it's-- The New Jersey Center for Teaching and Learning is a nonprofit, 501(c)(3) started by the NJEA, and it has -- it's President and Chairman were NJEA--

ASSEMBLYMAN WOLFE: Are you a part of this?

MS. STEWART: Yes. I'm sorry, I work with the Center.

ASSEMBLYMAN WOLFE: Okay. So I saw your Board of Trustees. You're not involved with AFT? They're not part of your group? They don't participate?

DR. GOODMAN: We're not, although we would like to work with them. In fact, a third of our teachers we're training are AFT members, and you'll be hearing today from AFT members who we work with.

ASSEMBLYMAN WOLFE: Okay. The reason I'm asking this-- I made a comment as we began-- I mean, we're here -- we hear the good news. This is great news. You're telling four legislators. If I weren't here today, I would not know that. And I would say the other 116 of my colleagues don't have a clue of the good things. All we hear about is retirement, funding, and complaints, and test scores. This is great stuff. So I don't know -- it's incumbent on whom to get out the good news? I mean,

our hearing today will be published, it will be passed around to our colleagues, but I doubt they're going to read it. It's going to be about this thick. It's going to be the testimony of what everybody says.

SENATOR RICE: And I already sent them one document to read. They're not going to read that either. (laughter)

ASSEMBLYMAN WOLFE: I mean, this is really nice--

I'm really congratulating you and the success you're having. And I just wish that there was some way that this could be disseminated to the world of New Jersey.

DR. GOODMAN: Thank you very much. I was talking to a group yesterday. They represented the people who are now putting fiber optic cable around the coast of Africa. So they're going to have Internet through Africa, and they're looking for content. They were blown away by this. This is exactly what they wanted. But they raised the same question, and we pointed out that it's a fundamental-- It's okay that it's there now, but we have to get the assistance of everyone, including yourselves, to promote what we're doing, because this is, by definition, a ground-up initiative. It starts in the classroom and works its way up. So when policy people make big decisions, it makes newspaper headlines. When we do it in our classrooms, no one hears about it until it bubbles to the surface. So it's not surprising that no one knows, but we have to sort of solve that problem.

ASSEMBLYWOMAN VOSS: One of the things that bothers me-- I'm one of the few -- and Dave -- we're one of the few people who are really cognizant about what is going on in education.

ASSEMBLYMAN WOLFE: So is she.

ASSEMBLYWOMAN VOSS: I'm sorry. (laughter) We're all cognizant.

But some of the things that noneducators look at, like merit pay and things of this sort-- I was always one for a lot of collegiality, a lot of sharing: "This works, this is a wonderful thing." And I think that the average person doesn't realize that all of the teachers have to work together to really impact well on a student. And if people seem to think that-- If I had a good lesson plan, I always wanted to share it with somebody, like, "This really worked well." And if we're going to go toward this, like, idea about merit pay, we're going to put teachers in competition. It's going to be, I think, detrimental to the students. So we have to get out this thing about sharing things and, when we have really good ideas, to get them out there. And the noneducators are forming the agenda and making, I think, rules that are not really going to be to the betterment of our education system.

DR. GOODMAN: I think you're directly correct. I'm going to have to speed up. But at some point it would be enjoyable to talk about that. I think what's happening to-- As a businessperson, people always told me I was going to bring business ideas to education. They think business ideas are cutthroat, and pay people, and fire them very quickly, and give them all bonuses. Modern business doesn't work that way. What's being foisted upon education, as a business approach to education, is really a 1960s General Motors business approach toward education. But General Motors went bankrupt.

ASSEMBLYWOMAN VOSS: Right.

DR. GOODMAN: If you look at modern businesses -- Google, Dell, Toyota -- all of those businesses use Deming's approach, which is exactly consistent with what you're saying. So it's not like there is even a contrast between business and education. All human enterprise is successful because of people working together toward a common goal.

I'd like to introduce Susan Polirstok, Dean of the Graduate School of Education of Kean University.

S U S A N P O L I R S T O K, Ed.D.: Thank you, and good morning.

Since the Legislature passed Public Law 2009 Chapter 51, Kean University has worked very closely with Dr. Goodman and the NJCTL on the Progressive Science Initiative. We feel that this partnership has yielded outstanding results which far surpass what we might have even imagined when we first began this project. And I'd like to share some of what I think is extraordinary.

First, PSI has increased the creation of physics teachers in New Jersey by 438 percent. In the eight years prior to PSI, all the colleges and universities in New Jersey produced a combined average of eight physics teachers a year. In the two years since NJCTL and Kean came together to work on PSI, the programs produced 70 physics teachers and 25 chemistry teachers, a 438 percent increase.

By next year, PSI will have directly impacted 20,000 New Jersey high school students. The program impacted 1,200 students the first year, 6,000 students this year, and projects 13,000 or more for next year. In districts such as Newark, Paterson, and Jersey City, students are gaining the opportunity to take physics, chemistry, and advanced placement courses in unprecedented numbers.

PSI has implemented technological transformations in classrooms in more than 35 high schools and at Kean University. All PSI coursework for high school students and for teachers enrolled involves the extensive use of Internet, SMART Boards, SMART Responders -- those are the clickers -- and SMART Notebook software. Technology is not a supplement or an add-on to the work of PSI. Technology is the typical way instruction is delivered and student response is accomplished.

Kean has embraced the PSI methodology, having offered our college Algebra and Physics I courses on campus using this methodology with higher pass rates than our traditional sections typically achieve.

PSI has created an innovative, new model in higher education for STEM teacher training and development. And at Kean, this has led to increased collaboration between science faculty and education faculty: the writing of new courses, the creation of three new degree options, and the development of new methods of content delivery. Kean's program also includes a course in teaching reading and writing in the content area, which we agree with the panel is quite important.

In addition, our program has something called a Professional Learning Community, where teachers who are using the methodology meet frequently, both face-to-face and online, to discuss what's working, what's not working, who has an interesting innovation, a great story that happened in someone's class which enriches everybody.

PSI's focus on working with experienced teachers to obtain new certifications in science is unique in the United States. We believe a talented teacher can learn the necessary content for science instruction, while a content specialist from private industry -- Bob Goodman is the

exception (laughter) -- may never learn to be an effective teacher. You can't assume that -- that we're going to recruit alternate route people who are going to hit the ground running and be very effective. There is a skill set of qualities that teachers have -- good teachers -- that is very hard to replicate across the board. So if we have talented teachers, we need to extend what they can do.

PSI represents an exemplary model of partnership for social justice through education. The program brings together school districts, teacher organizations, the corporate sector, higher education, the State Ed Department, the Legislature, and private philanthropy to empower all youth through innovative and effective STEM learning. Students enrolled in PSI are learning science and mathematics at internationally competitive levels.

Furthermore, the numbers of students doing so are large and growing larger, especially among historically underserved populations. In some of the schools that were on that chart that Tim showed you, advanced physics would never be an option.

Kean University stands as a proud partner with NJCTL and the other organizations involved in PSI. We are proud to be part of PSI's numerous accomplishments and accolades earned in just 24 months. We invite the Legislature to celebrate the achievements of PSI and to support the efforts to help the program expand in New Jersey, across the nation, and around the world.

PSI serves as a truly commendable beacon of educational excellence, one that was developed and flourishes right here in New Jersey.

I urge you to do whatever it takes to extend the pilot legislation so we can continue to do this important work.

I just want to take a minute to recognize James Lerman, the PSI Program Director at Kean University, for his vision and leadership in the development of this program. He is an extraordinary colleague.

Thank you.

DR. GOODMAN: And next up--

Do you have questions?

SENATOR RICE: Yes, and I'm going to take the liberty as Chair-- And I'll let the Chair of the Subcommittee deal with it.

A couple of things: The one thing-- I guess I'm-- I don't know. I'm listening to you, and it seems to me the human resource aspect of your organization is kind of minimal. And so I guess the question is: Is there a need? And if so, how do we expand the human resource piece if you're looking to do the whole state? That's one question.

The other question is: You indicated that you need contacts in the southern part of the state and other places. But my point is that -- superintendents have to volunteer? I mean, how do you get into the program? Because I think that's important. See, some things maybe we don't need to be volunteering, we need a mandate. I'm just not sure. I'm being honest about that. And we're spending money.

Tell me more about you wanting-- How do we get schools involved, or school districts involved with this program?

DR. POLIRSTOK: Sure. Dr. Goodman, Jim Lerman, Dr. Knab, Tim, and the staff that you've met typically have a traveling road show. We talk at conferences, school meetings, we visit with

superintendents. We try to get them interested in the program. It represents a complete shift in what they're doing, because we're taking the science sequence and turning it on its opposite end. And in order for them to engage, not only do teachers have to be trained in the methodology, but they need to equip classrooms with SMART Boards, clickers, the teacher needs a laptop. So there are inherent costs in their commitment to the program.

Right now, we only are working-- We don't really work with individual teachers from a district. A district usually makes a commitment, and then we train X number of teachers a year so that we can get the whole sequence moving. So in terms of human resources, you're looking at it. And right now, superintendents are making those decisions on their own -- whether they think it's an appropriate program to adopt or not.

ASSEMBLYMAN WOLFE: I'd like to ask a follow-up question. Obviously, we're very impressed by what you've done. Congratulations.

But typically, in all my years in the Legislature -- and I'm sure my colleagues hopefully would agree -- typically we have a bill drawn up. We ask that the Department of Education develop a program, and farm it out, and blah, blah, blah. You've basically done this on your own, outside of that. So in your experience, do you feel this is -- your model is something we should embrace and encourage, or should we still go back to having the Department develop a program and then have it implemented?

DR. GOODMAN: Well, the Department was very helpful at the beginning of this program. Lucille Davy, as Commissioner, actually

pulled the superintendents into a room. So we couldn't have proceeded without their help. So they were very important to this.

I'm not one who likes mandates, because I think that it just becomes people don't like things forced on them. We promised-- Assemblyman Wolfe asked us not to talk about money here today, but I think you were talking about other money. (laughter)

ASSEMBLYMAN WOLFE: No, no.

DR. GOODMAN: But one of the things that-- My last slide, if I were to get to it -- if I don't, it's better that I say it now -- is that besides introductions, the other thing that would help the districts a lot is some sort of matching funds for the work they're doing. Because what's happening -- and maybe that's going to be a little bit less now -- but some of the districts that were pursuing this found they had severe budget cuts, and it was very difficult for them to pay for things. They actually were accidentally firing the teachers they had just trained through PSI, and then they had to remember to rehire them. So it got a little bit-- It can be difficult for the districts. So Bayer Pharmaceutical, for instance, is putting up matching funds to pay for East Orange teachers to be trained as part of the STEM academy they're launching. But if there were matching funds for districts who wanted to embrace this reform of their math and science, and eventually reading, history, and everything else -- reform education in the schools -- I think that would be a huge help to us.

And we actually have 30-- We have three full-time people in the Center for Teaching and Learning, and we have Susan and Jim working with Kean University. But we also have 30 teachers, and you're going to see some of them today, who are writing our curriculum materials and

training other teachers. So it's teachers training teachers. We are very scalable. We could have-- We could train any number of schools and teachers, within driving or beyond driving distance of Teterboro, in a very short period of time if we had districts that were embracing the idea of doing this. So that is why I said at the beginning: If Camden, or Trenton, or other districts wanted to do this, the only obstacle-- I think we'd need to meet them, talk to them, and we need to-- If we could get the matching funds in some way that it becomes practical for them to do this, that would be a big help. But I think that would be enough, myself.

DR. POLIRSTOK: If there were competitive grants offered through the Education Department, that would be helpful too.

SENATOR RICE: Let me ask you a question. Let me ask a couple of questions here. This is important. I know we have other speakers, but I'm just-- I don't do this all day. To me it's important to get everything right on the record.

The school districts, to embrace this -- there is a cost. And once again, I'm looking directly -- and that's not -- that's my responsibility -- at the 31 "Abbott" districts, etc. And we will take a look at the moneys, because we know the moneys are supposed to be going back in the classroom. This is classroom activity. I'm not so sure they need money. We need to find out what they're doing with the money they have. That's why we're going to have the superintendents meeting. Because we want accountability.

And I can say this for the record: Not this program-- If I can't find a way to get accountability and regular updates on what is happening in these school districts once we put the money there, then we're going to

stop fighting for money -- at least I am. And I would encourage members of the Legislative Black Caucus to stop fighting for it, because we're mostly impacted. And I would encourage my members who are not members of the Legislative Black Caucus, who are impacted on this Committee, to stop fighting. Because we're spinning our wheels if we don't get accountability. And so I expect to get the superintendents' attention. And we don't want to mandate or compel them to do certain things. But if the only barrier is going to be -- is that we would like to do it-- I'll just use a town, say Camden -- we don't have the money, no problem; but would you do it if we can find a way to help you get it done?

The question is: What kind of money would you be talking about? What kind of needs are there? What's the most it could be per school district, I guess, or per school? How does this work?

DR. GOODMAN: To the Kean tuition-- The way this is done is, they pay -- for instance, to become a physics teacher in this program, you get 30 graduate credits. So at the current rate, that's about \$19,200 for the tuition for a teacher to go through the whole program and become certified at the end. To create a classroom with all of the technology, off the top of my head, is like \$8,000 or \$9,000. But multiple teachers can use a classroom. So you don't add those two directly together.

It's millions of dollars to change a school district like Newark, but it's not hundreds of millions or tens of millions, it's millions. For instance, to complete the entire program at Newark, and to have every student have access to a PSI classroom for Physics, Chemistry, Biology, and have access to teachers for AP Physics, AP Chemistry, AP Biology we figured out it would be about \$5 million more than they've spent so far. So

that's the scale of the problem. It's not-- Five million dollars is a lot for me. It's probably not a lot in terms of the other numbers that other people deal with. And I think that's probably a good yardstick. And we could actually get you numbers. But it's millions of dollars for a district like a Paterson or Camden. Starting from scratch, it would never be more than \$10 million or less than \$1 million probably.

SENATOR RICE: Through the Chair--

ASSEMBLYWOMAN VOSS: Well, what we're concerned--
I'm sorry.

SENATOR RICE: Through the Chair, get us some numbers. I know there may be preliminary numbers or an average. But get us some numbers, through the Chair. Because I'd like to take a look, and I'm sure my members would, so we know where we're going. We're not making any commitment for money. But we need to take an objective look at what we're hearing and what the needs are if, in fact, this program, once again, is all that it appears to be on the surface. So if you could do that, through us, we'd appreciate that very much.

Melanie, just make a note that we need that information.

And all this presentation-- While you're here, I don't want to forget, if you can make sure we have copies of this presentation for this Committee and anything else.

DR. GOODMAN: Absolutely. We'll get you estimates of half-a-dozen districts like Trenton, Camden to start from scratch and to finish in those districts, and to finish the work we've done in the current districts.

ASSEMBLYWOMAN VOSS: I think what we are concerned about is that \$500 million has now been allocated for the areas that used to

be referred to as the Abbotts. And we on the Committee want to make sure that that money is spent in the classroom for the students. And that's why-- I mean, when we said \$5 million doesn't sound like a lot -- not when it's part of \$500 million. But we want to make sure that every \$5 million we spend goes to developing this. Because unfortunately when we leave it to the discretion of the individual districts, the money is not always spent as we deem appropriate.

ASSEMBLYMAN WOLFE: I'm going to have to leave pretty soon, but I want to be politically correct and say I'm looking also at the non-Abbott districts, the suburban districts that really also can use enhancements such as this. So I appreciate your presentation.

DR. GOODMAN: Thank you very much.

One thing we haven't talked about is a question that could come up at some point: Why aren't the affluent suburban districts embracing this? And before -- say very quickly--

ASSEMBLYMAN WOLFE: They're not all affluent. (laughter)
There may be some, but none of mine are.

DR. GOODMAN: The schools that should be the top schools in math and science look very good compared to the other schools in the state, and they seem comfortable with that. But they don't realize they don't look so good compared to the top schools in China, Singapore, and other countries. So there's a little too much comfort there, because they could also be achieving very good results, better than they're achieving now.

But I'd like to introduce--

SENATOR RICE: Don't misunderstand this Committee. I need to be clear for the record. This whole Committee is concerned about

all of the schools. The reason I raise -- particularly on the (indiscernible) -- the Abbotts is because that's where money is being mandated right now. We are concerned about all of them, and that's why we want to know costs. But where money is being mandated, we want to make sure at least we start there and help us find some dollars for them. Okay?

DR. GOODMAN: Very good.

I'd like to introduce Ms. Dana, Principal of Newark Technology High; and Rosanna Satterfield, a teacher -- a biology teacher who became a physics teacher through this program.

M O N A D A N A: Good afternoon -- or it's still morning.

I just want to give you a little bit -- first, a little profile of the school; and say I'm very pleased to be able to present here, to show and tell about some of the good things that are happening in Newark, despite a lot of the negative publicity that we get.

Technology High School is one of five magnet schools within the district. It is about 16 years old, so it came without a big reputation. We have a little under 500 students. It started out as a purely vocational school. We do take students by application, however we do not get first -- we're not usually first choice at this point, as we are trying to build a reputation and a program.

During my tenure, I've been Principal at the High School for 11 years now, but I've been in the district 38 years in different positions within the district, starting out as a teacher and being at various schools within the district -- always in high schools. And I started to-- When I was reading some professional magazines, I had seen that they were talking about physics first, and I thought it was a very interesting idea, and I kind of liked

the concept, even though science was not my background. The article seemed to highlight some things that I thought were important. So I ran it by my department chair, who had been a teacher at my school, who taught bio, chem, and physics at one time. And I had a new physics teacher who was teaching -- who, for the first year was teaching AP physics. And they looked at me and said, "If you put physics in the freshman year," the teachers said, "I'm quitting. I'm not going to do this. It's not going to work." So I said, "Okay," because I did respect them. They were very bright and very well-educated within the sciences.

And then Dr. Goodman came to one of our superintendent's meetings and made his presentation. And here again now, I'm hearing about this physics. And I really enjoyed the way he put it and what he had said. So I said to my department chair, "I want you guys to go over to the school and see what they're doing. I think you're going to like it." Well, the whole science department went, all five of them. And they came back and were very excited about what was going on there. And they agreed that this would work at our school.

So I'm the kind of person who, when they do something, kind of just go at it all the way. So we decided the following year all my freshmen now were going to take physics, which was completely changing the sequence of courses. My dilemma was: I had two bio teachers who -- now I wouldn't need a biology teacher the next year. And I had only one physics teacher. What was I going to do? So Dr. Goodman's program said, "Well, not to worry, we have this program that can help get your teachers certified, and they can teach while they are getting certified." So I

approached my teachers about it. And Rosanna will explain her feeling when I approached them with this.

Let me say that after it began being implemented-- And I went into the classrooms, and I saw a transformation in science that was tremendous. The level of work that the students were doing was incredible. I saw students -- no longer just the teacher lecturing, then doing some work -- ditto, whatever. There was interaction. Students were encouraged to think and to defend their answers, not just rote back and forth. I saw instant formative assessment. These are the kinds of things that, as a principal, I'm going around to classrooms and trying to get teachers to understand: How do you know that Mary or Johnny got that just because somebody raised their hand? Here, using the technology, the teacher knew every child -- who got it and who didn't get it. So it really transformed the classroom.

It transformed the culture -- the whole setting of my science department -- because now they became a department. They shared with each other, they talked to each other, they helped each other, they became a community in itself and, I would say, almost to the jealousy of other departments in the building. And I have a very good staff at this point.

What I'd like to say also is that because of that, at this point -- and as Bob has stated -- my English department is saying, "How could we do this?" My math department -- we're looking to begin the PMI next year. And it's not just the curriculum, which is the big piece, but it's also the pedagogy and the way in which students are evaluated. We got from teachers, "Oh, if they don't have to do homework, they won't do it. If you don't grade it--" and all these kinds of things. And you know what? They

found the students are doing more homework. They're staying after school for tutoring when they need it. The students -- you talk to them, and they love the fact that only their test grades count. And I must say that we had students taking physics prior, and a number of students would fail. Now we have hardly any students who fail physics. And it's only on test grades. So there is no soft grade in there to say, "Well, you've downplayed the program, so now more kids can pass." That is not what has happened.

We have some of the data that I just want to go over. When we started the program, I had one physics teacher, and the seniors -- I had about 12 students -- 10 students who took AP physics. Then the following year we went up to about 18 students, but it wasn't moving. We instituted the PSI last year, and this year we had 79 students who, two weeks ago, took the AP Physics exam. It's all voluntary. The students were not forced to go into the class. They wanted to be in AP Physics. As a matter of fact, it's created such excitement that I have a group of students who have been badgering me to offer AP Physics C to them, and they're willing to stay at the end of the day for an extra period to be able to fit that in their schedule. So the commitment is there. And I do believe that the momentum will even get greater as the culture of the younger students is increasing. That will grow.

We now also-- And understand, that while they're taking AP Physics, they're also taking Chemistry and two math classes. They take Algebra II and Geometry all at the same time. And as sophomores, they have to come in at a zero period in order to get in all the courses that they need to fit all of that in, in their sophomore year. So it's a tremendous commitment on the students.

We have, I think, 32 students now who are going -- who asked to take AP Chemistry next year while they take Biology. And we anticipate then we will add, in the next year, AP Bio. So we're looking to move the whole program forward. And as I said, it has completely transformed the science program.

We weren't quite satisfied with just-- We knew that was happening, but we wanted to see what the impact -- to see if there was an impact on our math. So what we did was, the district had a data fair, and so now we were going to do our data on PSI and impact on math. So what we have found is-- What we tried to do is compare ourselves to one of our sister magnets who is considered the flagship school, Science Park High School. So what we did is, we compared their NJ ASK scores of their incoming freshmen to ours. And you can see the gap. The green is Science Park High School's NJ ASK and the percentage, and then our school. And there is a 10 percent -- they come in at 10 percent higher in their NJ ASK scores than we do.

Science Park does not teach AP Physics, and they do not have Physics in the 9th grade. They do it in their-- I don't know where. They don't have the PSI, anyway. And so what we did then was, we took the end-of-course algebra exam results, and we compared Science Park's to ours. And you can see we closed the gap in just one year by using the PSI. So we said, "Okay, is it the PSI only? Are there other factors? Did our math department just get better? Is it the math curriculum?" So we looked at our HSPA scores, and we see that we flat-lined. So we know that it wasn't about the math program that improved the end-of-course algebra results for us, to change that gap between us and Science Park High School. So we are

attributing it to the PSI. Because right now we only have a year-plus data. So we're trying to look at the whole thing to see how it impacts on other things.

So at this point I'd just like to introduce Ms. Satterfield. She is -- was Teach for America. She came to us as a bio teacher and went through the program along with-- Actually, I have five teachers -- no, actually I think there are seven of you now who have gone through the program, including one of the teachers of the deaf who had gone through the program. Because we have the only deaf-ed program -- secondary -- in the district. And they are inclusion students. So our deaf-ed teacher taught physics.

DR. GOODMAN: It's worth noting, by the way, just talking about scaling-- To scale up this fast, we ran out of Teterboro teachers to teach the new school teachers physics. So Michelle is the teacher of the deaf who we taught physics too. In January she began teaching not only-- In September she began teaching students; in January she began teaching the next cohort of teachers physics. So she became second generation basically in this program. So that shows that exponential growth is possible, because we can keep creating trainers as we grow.

R O S A N N A S A T T E R F I E L D: All right, well, thank you very much for letting me come here and speak to you about how PSI has impacted not only my teaching but, more importantly, my students' learning.

As Ms. Dana mentioned, my background is in biology. I came to Newark in 2007 as a Teach for America Corps member, and I taught biology at Technology High School for two years. And I decided that I

wanted to stay on longer and continue teaching at Technology. So in the spring, Ms. Dana pulled me into her office and said, “Well, Ms. Satterfield, next year you’re going to be teaching physics,” (laughter) and I laughed because I do not have a background in physics. I never particularly warmed to physics in college, and I didn’t really understand how that could possibly turn out. But she explained to me that there was this great program that would train a teacher so that over a summer I would be transformed from a biology teacher to a physics teacher.

And the other biology teacher and I were very skeptical, so we did indeed go out to Bergen to visit Bob, and he gave us the dazzling presentation and convinced us that, yes, the curriculum was rigorous enough that our 9th grade physics students would be competing at AP levels by their sophomore year; and, yes, a science teacher or any teacher with any background can be taught to teach physics; and, thirdly, that our students would succeed in this physics course -- our kids in Newark.

So I went through the summer training program and started teaching physics in the fall of 2009. And I have to say that at Thanksgiving, as I was sitting around the family -- around the table with my family, and everyone said one thing they were thankful for, the very first thing that popped into my mind was, honestly, PSI physics. (laughter) I mean, it completely transformed my teaching, my classroom. My classroom became a setting where the kids were all very interactive in their learning, and where every single child was met by the curriculum so that all of their needs were met, and that they were all growing at the same rate together and really experiencing that feeling of mastering physics.

So it was an exceptional opportunity for me to be a part of this. And this year I taught two sections of AP Physics B. So our first group of freshmen and sophomores taking the course -- and got to see them take the AP Physics B exam two weeks ago, and we are anxiously awaiting their scores. But the kids felt great about it.

And as Ms. Dana said, it really has transformed our entire department. There is such a higher level of collaboration. We are always talking about what we're teaching, how we're teaching it, how the students responded to it, sharing best practices for teaching a particular topic. And we've gotten involved with some other organizations, like Rutgers University, and have guest speakers coming once a month to speak to our AP physics students to continue to foster their interest. And it's so awesome to hear the questions that our kids are asking these professors of physics from Rutgers University. They have higher-level questions; they're really thinking about the material and understanding the content. And that's reflected in their level of questioning.

DR. GOODMAN: And Liz--

By the way, Rosanna -- one of the other benefits we get is, we have a whole bunch of biology teachers now we've taught physics -- how to teach PSI Physics too, including Liz. And they now rewrote -- these are part-time people for us. They're rewriting our biology materials all to match what they've learned from doing the physics. So the cycle just keeps building on itself in continuous improvement.

This is Liz Henriquez, a teacher at Bergen County Technical High School, in Paramus.

SENATOR RICE: Excuse me one moment, a quick question.

Is the program geared for teachers who are teaching presently, or-- What if I'm looking for a teaching job, but I have yet not taught, but I have credentials?

DR. GOODMAN: That's a good question. We just applied to be an alternate route provider so that people who want to enter teaching with a degree can do that. We'll have the ability, we think, in the future to do some sort of residency program that's being talked about for New Jersey. But that's just in its early stages -- where someone could enter without that background.

So we're looking-- Once you have all of the materials and structure in place, it's possible to implement it in a number of different ways. We're also looking at people who are doing online coursework by taking these same materials and adding some other elements to it. So it's really opening up a lot of possibilities. So suggestions on that would be good.

Liz.

E L I Z A B E T H H E N R I Q U E Z: So I come from a totally different background than everything else you've heard here so far. I teach at Bergen Tech, in Paramus. It's a vocational high school. We have culinary, we have cosmetology, we have all your typical vocational stuff. However, our full-time population is 100 percent special ed. Every single one of my students has an IEP. Let me say that one more time. Every single one of my students has an IEP.

I taught at Bergen County Academies in Hackensack for eight years. I moved over to Paramus to fill a need for a mid-year replacement of a biology teacher. I was supposed to be there for half the year and then go

back and continue teaching biology at the Academies. At the end of the year, I was begging my Principal to let me stay. I love working with special education students. It's changed my life entirely.

However, the problem was, we didn't need an extra bio teacher the next year. So Carole Terrizzi said, "I'll make you a deal. If you want to become a physics teacher, you can stay here." (laughter) And I nearly dropped dead. I did not take physics in college. I hadn't taken a physics class since my senior year of high school. I'm a biology person. I was a geneticist.

So I went over to talk to Bob, and he flimflammed and bamboozled me into joining the program. And let me tell you, I never want to teach biology again. It's changed my life. But more importantly than that, it's changed the entire culture at my school.

I don't want to repeat what you've heard from the other people, but I have students who walked into my class in September -- and it's a culture of *can't* coming from them. These are the students who are always the last ones in class. They couldn't do anything. They were the lowest in the class. So I brainwash them in the first couple of weeks, and by the end of October I don't hear, "I can't," anymore. Nobody is saying they can't do this. I have kids who are staying after school on their own time. I have kids coming in, in the morning, before school. I have students coming in on their lunch. Now, they're not just coming in for extra help, they're coming in to be tutors for other students. I wish I could have brought you some of the e-mails I've received from parents who say they've never heard their kids come home and talk about a subject before, let alone science or math. That's so hard.

I have a senior next year who did not take physics because it wasn't offered when he started, who has gone up against guidance and fought so that he could take it as a senior, knowing that he's going to be in a class with all freshmen. He doesn't care. He wants to take it because he's heard how excited everybody is about it. You walk down the hallway and you see students helping each other.

Now, let me just say my top student last year was a girl from cosmetology, and I was so proud of her. She was awesome.

The culture has just radically changed. Now we have -- we're running chemistry right now, so now we have two years worth of kids doing the program. When I go to IEP meetings, and I sit with other teachers and talk to parents, I feel like I'm on a different planet sitting in those meetings. Because at the meetings, they're talking about how the kids struggle, and how in other classes they're off-task all the time. I can't say any of that because they're always on-task, and working, and cooperating with everybody else. You walk into my classroom and you think I must be so hard on them. No, they just want to learn, and they're doing it all on their own. They're all participating. They know the homework doesn't count, and they're all doing the homework. It's unbelievable.

As far as collaborating with other teachers, it's also changed our school that way as well. Recently, I ran a field trip for my kids -- my physics kids -- where I brought up a NASA scientist, and we launched a weather balloon 100,000 feet in the air with a video camera on it. We went out to Pocono Raceway. Tim came out to watch with us. And I'd say, of the 60 kids who are in the 9th grade, I think we had 52 who chose to come. It was not required. They wanted to come. They had to do all kinds of

extra work to learn about what was going on. And I prepped them and said, “There’s going to be reporters there. You’ll probably be interviewed.” I can’t even begin to tell you how proud I was of these kids when they were talking to the public, to the NASCAR people, to the reporters who were asking them really hard questions; and they knew the answers to them, and they couldn’t wait to tell them more about their experience. They’re just-- I can’t say how much it’s changed their lives. I get e-mails from parents.

As far as collaborating with other teachers in the building-- My fun story: Last year, when we first started, about in October, one of the algebra teachers who was not aware of the program came into my room one day and said, “I just need to know what’s going on in here.” (laughter) I said, “Why? What do you mean?” She said, “Well, I threw this word problem up on the board just to see what they could do with it.” She goes, “And I’ve never had this experience before, but when I said, ‘What’s the first step? What should you do?’” she said, “The kids always say, ‘Read the problem.’” She goes, “Every single one of the kids in the class said, ‘List the givens.’” (laughter) She said, “I don’t even know what that means, but something must be going on.” The way these kids tackle word problems in their algebra class now is completely transformed.

Right now I have our financial literacy teacher at school using our methods to teach financial literacy to the entire 9th grade as well. She’s working on making SMART Board presentations. She uses the clickers. And she’s teaching compound interest equations to students who are on -- some of them are on a 4th and 5th grade math level. And she threw up the compound interest equation -- which I don’t even know what it is -- and she said she didn’t even have to teach them how to do the math on it. She gave

them an equation, they knew where to pull the information out of the problem, and they solved the problem for any variable she could give them. It's amazing.

So in another -- going along with the balloon launch I did, we applied to go down to NASA to be -- they're running a pilot program right now for teachers to go up and fly with them this summer in their zero-gravity, weightless aircraft. You had to bring a team of five teachers with you, and they didn't really say what kind of teachers to bring. But it was only advertised for science and math teachers. So all these teachers who had been coming to my room saying, "What is going on in here," I bamboozled them into being involved with it. So out of 14 teams across the country, my special ed kids were chosen as one of the teams.

ASSEMBLYWOMAN VOSS: That's wonderful.

MS. HENRIQUEZ: They have to do stuff in all the classes associated with this. They don't get to fly, obviously. We get to go down and fly. But instead of doing science and math, I'm going, a math teacher is going, and then I'm bringing all humanities people. I have a social studies teacher coming, I have the financial literacy teacher coming, and I have an English teacher coming. And they're all developing units based on what PSI starts for the kids in their respective classrooms. So it's moving outside of just science and math very quickly in our building.

ASSEMBLYWOMAN VOSS: That's great.

SENATOR RICE: So I see the formula is that someone talks about the program, you go see Bob (laughter), Bob brainwashes everybody, and then you go back and brainwash the kids, and we have success. I like that. (laughter) That's a good formula.

MS. HENRIQUEZ: There's one more step to it though. Every time somebody comes into my room -- because it's a revolving door of teachers coming to watch -- I always tease Tim and say, "I'm pouring the Kool-Aid. I will give it to them. They will be believing as soon as they leave." And every single time people just -- they're amazed. I had a teacher from Sussex Vocational last week-- They were special ed teachers who came, then there was a physics teacher already who, at the end of my lesson -- we were doing electricity -- she said that her students in her college prep class don't do the level of math that I was doing with these kids.

ASSEMBLYWOMAN VOSS: Wow.

MS. HENRIQUEZ: I mean, it's a compliment to the program, it's a compliment to the kids, because we've raised the bar for special ed as well. And I do not change anything other than maybe I take a couple of questions off a test for their time-and-a-half limits. But I don't have to modify anything with this program.

DR. GOODMAN: It's worth adding, you know, I taught the inclusion special education kids in my schools physics and chemistry, and we have other teachers who do that as well. And a number of our schools have special education students -- inclusion or special classes. And I'm told -- and I know it was true in my classes, but I'm told generally -- that the only classes that the teachers don't modify tests or materials for are our materials. And they say that's because it's -- everything we've done is universal design. We've put in all the scaffolding and help for all students, that any student would need, so that you don't have to modify anything. And I'm also told that the only -- many classes, not just in Liz's -- that very

often the only class that there are no behavior problems in are our classes, because the kids are so involved all the time.

ASSEMBLYWOMAN JASEY: They're engaged.

ASSEMBLYWOMAN VOSS: They see the relevance of what they're learning. That's the name of the game.

DR. GOODMAN: And I totally skipped telling anyone here about PMI. I'm sorry. I will have to do that the next conference. But you can just-- To make it very quick, we've done the same thing as science with mathematics. We now have K-12 mathematics coursework, which will all be completed. We're training teachers in it this summer. And so we've used all the methodology. And teachers were already using it on their own. The training of teachers begins this summer, and we're going to then try to extend the endorsement program to create new math teachers beginning soon. We haven't done that yet.

SENATOR RICE: The program itself -- is it-- We're not into the other counties yet? In other words, we're right back where we started -- Teterboro moved this way, because you said there was a conversation with somebody in Sussex County. We're not there yet -- Hunterdon County, Warren County?

DR. GOODMAN: I don't remember all of the schools, but we're now in Orange, South Orange. We're entering some of the Oranges -- East Orange with Bayer. We're going to Perth Amboy next year -- starting with it. Sussex, I believe, is starting -- Sussex Vocational. So there are districts picking it up. There actually is a New York City school, as well as a Vermont school that are using it. We have a teacher who is driving -- this is actually amazing -- in Hunter-Tannersville, New York. Their

superintendent heard from Vermont -- he heard my presentation in Boston at November's conference. He came back and commuted back and forth. That's how I got to the Vermont superintendent's association. So word of mouth through that. But this teacher from Hunter-Tannersville is from New York. He is driving an hour and 20 minutes each way to attend our classes, even though this won't lead to certification in New York. He just wants to learn how to teach physics.

ASSEMBLYMAN WOLFE: Have you been approached-- I know we do have executive superintendents -- county superintendents somewhere. (laughter) Not in the towns I represent, but-- I mean, I assume they meet. I mean, have you made presentations to them -- I mean, to the county superintendents?

DR. KNAB: We haven't as of yet. We did, early on in the program, go to the Burlington County superintendents, and we do meet with superintendent groups. And we are looking for inroads to try to get to them. I might also add that tomorrow we have a group of math teachers coming to the NJEA -- the ones who developed and piloted the PMI program. And what we do is, there's a group of math teachers coming from Trenton, coming tomorrow, who are going to join us to learn about the program. The Trenton math supervisor is going to be there. We've been trying to work our way into Camden and some of the other districts too. It's just like we're playing hop-scotch down the state so that we can cover more places.

ASSEMBLYWOMAN JASEY: Well, there are a lot of things I want to say, but the time is growing late. So in order to wrap up, first of all I want to thank everyone who came. I wish everybody in the Legislature

could have heard this presentation. And so I'm sitting here thinking about-- You know, you talk about scaling up. I'm trying to figure out how do we get this information out there. And I think you're probably spending a lot of your time and energy trying to figure out how to get to different groups. And so I think what I would like to take away from this meeting today is a commitment from other members of my Committee here to sit with you and come up with a strategy or a plan--

ASSEMBLYMAN WOLFE: Are we passing Kool-Aid? Is that what you're-- (laughter)

ASSEMBLYWOMAN JASEY: --to come up with a plan to get this information out there, and not mandate the program but rather make it available -- more available to all of our districts. And I think that we probably should start by not only talking with you, but also talking with the Department about how we move forward. Because one of my concerns here is that the rest of the world is paying attention. They're having you go here, and there, and other states want you. And I said this to you in my office. Before you go to all those other places, I want to make sure that we have this in New Jersey, because you started this program. There's nothing as powerful as an idea whose time has come. I believe that sincerely. And I believe that we are very much at a point where not only is reform coming, but we have to figure out better ways to engage our students, to make the material relevant to them, and to teach it in a way that they know they can be successful.

Because as soon as you -- as soon as the student begins to experience success, it almost doesn't matter what subject it is -- it helps that student feels like, "I can do this; I am smart." And when we look at kids--

When they start out in Kindergarten, 1st, and 2nd grade, they all believe they're smart and capable. And something happens to children -- too many of our children -- so that by the time they hit middle school, it's, "I can't do that. I'm not doing that." And when you think about what happens in sports-- Coaches don't say to students, "Okay, we're going to go out there and win every game." Rather, they break it down, and they teach the skills needed, and they teach the drills and strengthening, or whatever it is. I saw it over and over again with my kids. I was always amazed at how well they learned things that they didn't know anything about, whether it was sports or academics. But the key was the teacher or the coach being able to break it down, make it relevant, and help them experience success, because success begets success, right?

So I love the story about the biology teacher becoming a physics teacher. I would find that daunting, but obviously it's working. So I think we have to figure out how we replicate, scale up, and support the work that you're doing so that all of our kids -- urban, suburban, rural -- I don't really care where they come from. I'm concerned about all of them -- so that our teachers feel successful and supported, so that the leaders in the buildings feel like they have resources, and superintendents -- county superintendents, whomever -- know that we have a model that works. Clearly this is a model that works. And I don't think this will be the last time we invite you here. I think we're going to need some follow-up. I think we'll talk to other members about this, because I think people want to know what works and how do we support what works for the benefit of all of our kids.

So I want to thank every one of you for coming. I know that May is a very busy time in school. And all of you probably had to get coverage and give up something in order to come today. And I totally appreciate it. And I also know that our time is short, because the members have other places to go. I actually have to go give a speech at a baccalaureate later today. Not good planning on my part. (laughter) I have a hard time saying no to people.

So I thank you so much for coming, and I expect this to be only the beginning of an ongoing conversation. And you know where to reach me. Rosemary and Bob have been to my office a couple of times already. And, I mean, I was so excited about the program the first time I heard it, I just wanted to share it with my colleagues.

So thank you so much for coming, and we will be in touch.

DR. KNAB: Thank you.

DR. GOODMAN: Well, thank you very much. And we also have a hard time saying no to anyone, so if there's any place you want us to go or talk to anyone about this, let us know.

SENATOR RICE: We'll talk about a strategy among ourselves to maybe get people into a room who need to be talked to, or maybe get them in a room who really need to hear the presentation. That's number one.

Number two, I'd like to encourage my members on this Committee-- I sent you a document. I think it's important that you read it. If not all of it, at least read the introduction and then go into the strategies and the marketing. And the reason I'm saying that, in all sincerity, regardless of what side of the issue you stand on, it gives you -- it

kind of answers your question, Assemblyman Wolfe, as to why we can't get the message out. Because we're up against a lot of money nationally and internationally that is buying every type of media they can to keep messages like this from getting out.

Thank you.

DR. KNAB: And thank you.

Please come visit our schools.

ASSEMBLYWOMAN VOSS: I just want to thank you, because I love teaching more than anything. And you guys made me so happy today. I can't tell you. (laughter)

Thank you.

SENATOR RICE: Oh, I'm told to adjourn this meeting.

(MEETING CONCLUDED)