

Room 211 Session I

Facilitator: Doug Robertson

Name of Presenter(s): Ron Cantor, SMCC President and Jean Moon

Topic of Presentation: Presenting their current project on STEM, Sustainability, & Science Policy --- Connecting secondary and post-secondary education

My name is Ron Cantor and I'll confess that for our purposes we want to learn as much from you as you want to learn from us. So let's start by please introducing yourself and when you introduce yourself tell us about the different hats you wear. If you are involved in...especially if you are involved in any organizations associated with stem sustainability or public policy in addition to your job or related to your job. So who doe we have here.

Suzanne Hamlin - I am a business strategy consultant and I do a lot of work with start up technology companies because that tends to be who are trying to introduce new products usually and I help them think about how to bring products to market, and because a lot of activity is focused on our_____ technology clusters here in the state I tend to do a lot of work on that. Home energy certainly being one of them and of course good old high tech stem related people and I also work with Gulf Maine Research Institute with their education group. I have been doing that for about 10 years now.

So my name is Mickie Forest. I am currently am a middle school teacher at Deer Isle/Stonington Elementary. I retired from teaching chemistry in New York and in 2004/2005 I was a fellow on Capitol Hill and I managed Senator German's education portfolio and actually he is the chair on the senate side caucus and I organized the first meeting of that caucus. I have a lot of understanding, I feel, of nation policy and I was sort of horrified when I started teaching in Maine and realized that there weren't state standards or state assessments the way that I was use to and so I am just here to be part of the process.

So you would technically be qualified as a policy _____.

I would, I could... (Laughter)

I'm Linda Misner, I teach mathematics at Southern Maine Community College and my main reason for coming to this conference was to see how in the math classroom I can help the process move forward. I'm pretty new to how that might happen. Another...one thing I just started getting involved with is an NSF grant that we just got working with Bowden for quantitative literacy.

I knew that...

That is somewhat connected with this whole stem, so I am looking to see how that would fit in as well. I think that is pretty much in terms of relevant to what we are talking about.

I'm Pat Simmons from the Millinocket Department of Education. I'm on the Research Standards and Assessment team. that is a group of all the content people of the

department are on. We are a next generation _____ states that are involved in that. I coordinate the math/science partnership projects for Vermont. I facilitate the internal _____ department team at this point in time. We are trying to branch out _____. I reviewed kneecap items for science in the past and am also involved in the ultimate assessment, assessment and organization of how the court fits in...UCLA and English arts and mathematics and a couple of other things, but that is good for now.

I'm Dirk Robertson and I am with the Maine Department of Education. I work in the career and technical education part of the department, agricultural and natural resources education, and I am going to try to take some notes of the main ideas and stuff like that and when we get to the end there will be just 10 minutes or so to go over, it will be kind of a question time where we can ask more questions. So I am going to get that stuff up and running and now I think I have this _____ going so I am all set now.

My name is Ron Cantor and I have been president of Souther Mane Community Collect for 6 months. I came from upstate New York and I've got fresh in my mind the comparison between the college I just left in New York State and the college I just came to in Maine. The difference in policies and the difference in budget which is immense for two colleges of roughly the same size and years ago a president that I worked for, I heard a speech by the governor in New York and I got all excited because he said such wonderful things about how he was going to support higher education and I went back and told my president, the governor said he was going to give us this and this and my president said to me, real policy is written not in words but in budgets, we will see. So here I am and I can see a very different budget picture in Maine and that is about as much as I am thinking.

Is it better or worse?

For a college about the same size in New York the budget is 20% larger and they are crying, oh my God...

I'm Jean Moon and about a year ago I returned to Maine which is where our residence had been for many years but I was commuting back and forth to Washington DC. I have been at the National Academy of Sciences. First I was their Inaugural Director of Board on Science Education and then I went on to be senior scholar and actually worked some _____ doing a different thing as well as working across. there are three academies that form the National Academy, the Institute of Medicine, the National Academy of Engineering and the National Academy of Science. And just like in any institutions the finals are alive and well and so it was my job to try to get some cross walking, productive, interesting _____ and conversations going. Now that I am back in Maine I am fulfilling a life's dream and that is raising up my own educational institute nonprofit called HiMark Institute. I reside with my family in Damariscotta and so I am getting to learn more about Maine and some of the issues that are present and part of our realities here although I still continue to work at the National and at the _____ level.

So what Ron and I want to do today and spend a short time talking to you about a project that we are affiliated with which we think has the potential of leveraging some revisions, some reformulations on the way policy might be done in the state to be more attentive to this phenomenon called stem and sustainability science and how sustainability science could serve as the core organizing principal for what I'm beginning to think is not only your early gateway courses in community colleges and a new graduate environment that I think have real potential for instituting and igniting what we would all like to see and that is greater conversation between the world of secondary education and the world of post secondary education. So, we just want to kind of give you the light version of the project because we need your help in brainstorming how you can imagine this project working to the advantage of the various constituent groups that you're involved in where...

Sometimes policies isn't helpful...

If I could interject one quick thing too. I should have announced from the start that that is recording so we will have this session recorded. Somebody is going to be transcribing later, I guess some of the transcription is automatic and then I will be trying to capture some of the main ideas but we will have that as a backup and then toward the end we have a few kind of key questions on the kind of so what part and what people think about that. We will all kind of throw out for 10 minutes or so after...

So that makes you the timekeeper....(all talking and laughing)

I think you had better keep some time here for us here.

Yes.

Can I do anything to help you with this.

Do you think that these markers...are these washable?

No.

There not.

So you can't use them on the board.

It says washable...

It does but it won't work.

Yea, those will come off, you can take them...

I don't think we are going to need the screen.

No, I don't know if I touched this...I was going to turn it off if we didn't need it, but.

Because we could put more of these (background noise). Yea.

Turn it off.

We are not going to be paper heavy but it seems to me that just getting some of the vocabulary down will be helpful. Okay. So, in my own mind I call this project SQ which is stem and all the elements and components individually and together that they represent, sustainability and science. Okay. Now as I just was giving you the overview, this is a national effort where five states, Maine being one of them, have been identified to really grapple with this conundrum of how policies can effect these two entities. Stem and sustainability and to see if policy can help marry these two in more productive ways, again particularly at the secondary education and early post secondary. Now the other states involved with us are Colorado, Maryland, Arizona, and all the way out in California and Maine. Why were these states chosen? They have things cooking. they have things cooking around stainability. A big piece of why we are attractive is because of the Ebscore(?) project and how the Ebscore Project has seeded a lot of individual projects and is working with community colleges, four year institutions, and private institutions all-around the idea of sustainability. But the challenge to each of these four or five states is how do you take what is often time segmented work, individual activities and you use the policy leader to try to give that catalyst boost into whatever you use for energy so that these two entities; stem and sustainability come together in a more productive ways and in more resource rich _____. Now when we talk about stainability, and again these are just some of the big ideas that are driving the project. Lets say we click sustainability on this kind of continuum and often times when people think about sustainability they think about things like, well I am going to be more energy efficient because I am going to contribute to the quality of sustainability in my local or my state; or you could be thinking about a product that is more energy efficient. For example, a certain kind of furnace or a certain kind of window product that you would use in your home. At the other end of it is something called sustainability science. And this is really the end of the continuum that I think our project is more interested. That end certainly impacts this end in terms of innovation, creativity, new products, new products then that generate new jobs, that change the configuration of your work force either in a regional way or state-wide way or in a multi-state way. But in terms of our target which is secondary and post secondary...we are really talking about this entity called sustainability science. Does that mean anything to anybody, sustainability science, and when I use that term what are we talking about here?

(too low to understand)

Okay.

Can you say a little bit more about...

Yea.

Thanks.

Just what I needed a prompt. Most of science today is practiced in a way that you don't just do chemistry and then...although people in biology do biology and all the people in physics do physics. All of those sciences, individual sciences are operating in what we call a transdisciplinary way. But when you get involved particularly outside academia, although in the research component of academia this is certainly the case for transdisciplinary. You...the idea is to break down silos between the sciences including mathematics. And to see the way in which each relates to one another as the focus, the biggest focus in science today is on solving problems. And don't we want our children to be good problem solvers? Yea, and so when it comes to innovation and when it comes to designing products at this end of the sustainability continuum, this kind of critical skill is absolutely important but it has to be married with an understanding how _____ operates.

Has that little introduction helped?

So, in your experience where you teach or where you go to school or where you have been to school, do you find that the sciences are integrated with one another or do you find that they are pretty much offered as stand alone experiences.

Well my mathematics classes stand alone. Um,...

So, you or the physics department haven't gotten together and figured out...

I have not personally, no. I can't speak for my colleagues but I personally have not gotten involved with what other people are doing and bring it into my math class. I do, you know, lean toward a text book that I choose, it is just published, it has economics in it, it has physics in it, it has got medicine and so it does begin to reach out to other disciplines and frankly I find the mathematics more interesting when I see that context...

So, there are multiple contexts.

There are multiple contexts. Exactly the multiple contacts, you know, why do you need multivariable calculus to study economics and you can see that. The hard part is I don't know what physics...I don't understand enough physics. I need to have this person to kind of boil it down for me where I can say, okay, I see the math.

I get where my mathematics is playing a role here. I need to see where it sets.

So when we are talking about an effort to draw together these disciplines in a way that are more reflective of the profile of potential work force needs. And this is really what is driving this. This is a work force project, in many respects and it is figuring out how you get through the policy piece to support institutions to do the reconfiguring they need to do so that you can arrive here and begin to play around with some of the ideas and encourage institutions or _____ a group of institutions to get aboard on this new innovation.

So, Jean, what do you think are the policies that support that because I would say that, you know, I won't speak for the great state of Vermont but I will tell you...(laughter) so in Maine most of our math and science is, you know, compartmentalized. It is not everywhere but much of it is compartmentalized. So what are the kind of policies that need to...I hope it is not a hammer...

I don't think that will work very well.

When you say science policy, do you mean science education policies?

Okay, I think if we think about it as a pretty big umbrella. For my mind this is both a science and science education policy issue. And generally, again in Maine, I don't know how it is in Vermont...

Oh, were not that much different.

Why this puzzle is hard and you need to get into this conversation. I'll just stop with these.

Part of it is just inattentive character of the average Mainer and where Maine policy in the past has come from. Because, yea, it is very compartmentalized amongst the disciplines but it is also compartmentalized between the school districts.

I think you said one key word that ties all this together and that is work force. Because work force, the concept of work force practically can break down all the barriers between the different disciplines, between science education policy and science policy. Because really pragmatically what is going to drive it. Economically creating more jobs in the State of Maine. that is what people will support and that is what policy makers will support and I think that the concept of work force can be used as a lever to get ride of those artificial barriers in many dimensions.

When you say, I'm sorry I am really just struggling with the terminology here. When you say science policy are you talking about the state creating rules for what some private company does with their science research and development or are you talking still within the school.

I'm talking about...when I talk about science policy I'm talking about policies that affects resources, higher education, try new and innovative ideas and talking about the same thing that would go to k-12 to get them some affordances to try their models as well as...

..the schools within these districts.

For example public policy and resources to support partnerships between schools, businesses...

But we are still talking within the context of the schools, you know, sort of broadly within the school system including community colleges.

Including but I think it is much further than that. I think it is including businesses just as much as it is including schools and colleges.

Right. I'm wondering why you selected secondary rather than the whole system, you know, K-12 system.

It is the design of the project and the designers I think felt that that slice probably was a healthy enough bite to take off. And the work force argument is actually...has more traction in the high school, community college 4-year setting than if you brought these ideas down to the elementary and I am not saying that they shouldn't.

Right, right, but it seemed to me there is like...it is the system, we know all the parts of this system and we heard that data this morning about the 4th graders wanting the science and were interested in stem and breaking down in 8th grade. So I don't think they are much different than us but in elementary school, not a lot of science out there unfortunately and it is, yea, I really think it has to be approached as a system and maybe this isn't the place to do that but really that case sixteen piece has to be really looked at, all of the parts if we want to get kids going into stem careers.

Not being _____ a valid point that it really is. I think it is their job as they invited us in. I would rather take a little bit than not get nothing...to get us started in the state on this conversation but what you say is absolutely true.

I wonder whether it will have the same protectory that might _____ in other companies found once they started digging around but it seemed like a business to college connection, which then it seemed like a business to college/high school connection and then realized its way that it is really about K-12 and really need to support a much broader picture particularly because of the stickiness of career ideas at the upper elementary and middle level. I will be interesting to see where it goes.

Absolutely and Mike Dubeak's group I think is an excellent example because we educators could yell about we need more policy and resources and everything else to support what we need and it gets nowhere but here comes Mike Dubeak with a business and brings in other business partners. Now suddenly this is _____ right to the partnership than policy makers pay attention to the schools that they wouldn't have without business in the mix.

Right, right. We have a really marvelous opportunity...

And I think too, Anita, our team met just last week and one of the things that we absolutely all agreed to is that we don't want to be another umbrella group. We want to look at what is out there and Ron is going to take over the conversation and do some brainstorming with you all for potential groups we should be advocating. actually we do

see ourselves as a leader that some of this thing work force ideas that Mike is thinking about Educate Maine, are imbedded in here and can this work in our association with these four other states and being in the national _____ moving their goals along so _____.

We certainly know that at the state level; Pat and I have been talking a lot about that in New Hampshire as well as collaborating, I think _____ collaboration will benefit all of us tremendously. So keeping...I am going to have to...this is the first time I have sat down all day. I want to be really part of the conversation...

Well stay...

I can't (laughter) but I think it is a really important connection so I am excited. This needs to interface at least in Maine with the governors stem council...

...the other group that was mentioned...

...as well as the stem collaborates. I think there are probably comparable pieces in other states but I pleased to...

And eventually I hope that this project travels to other states in our region.

I will talk to you later.

Yea.

That is an important part when I got back last week we talked about the fact that we didn't want to be a solution in search of a problem. We didn't want to form another entity umbrella or otherwise that just got in the way of other existing entities, so we looked on that...we had a piece of paper that roughly described Ebscore and some of the partnerships and some of the agencies associated with that and we want to recognize and respect what any other alliance or organization is doing and we want to ask all those different organizations and you in this room what should we be doing and what could we be doing in order to help achieve the noble goals that we are talking about here of having more supportive policies versus availability of science and education.

And I actually...I'm going to sit down...

I will too.

Um, how could we leverage that idea through the groups that you know of and your working a lot with the Gulf of Maine but they have work force issues as well in terms of sciences and getting the right kind of sciences to stay in the Gulf of Maine and a lot of what we are talking about in sustainability science, they are really thinking about this as well. So they should have a vested interest in this conversation and we don't want to

exclude we want to include and we don't want to replicate. So we could really use your help in brainstorming and that.

I don't have an idea, I have a question. there is something I don't quite understand is I hear talk about brain drain and my children were educated in the Maine system and of the three of them two of them went into stem and both are gone out of state. Their stem careers took them out of state and then they were talking today about how we need to import stem because we don't produce enough stem, so do we or do we not produce stem, I mean we are producing stem but they leave so we are importing stem, I mean is that...

Well when Mike Dubeak presented those figures very clearly in the IP field especially the IP field as he describes it which is the higher end, he is working to hire cyber security experts, Ph.D.'s in computer science and so forth. And clearly his company and other companies like that, they cannot find them home grown in Maine, they have to import.

Is that because people are...of course...but...

No, I was with you. I actually teach six through eighth grade science (all talking and laughing) but I teach the children the fisherman and part of our mission statement is to create a thriving Island community where we can educate our children and they can find jobs and stay. It is very frightening to the fishermen if you are going to educate your children and they have to move away in order to pay their college debts among other things and so I love the work force, however, we are looking...we need jobs here.

So you look at what is needed, what work force is needed. We need...

Right it is a chicken and an egg kind of a deal here. You mentioned the southern clusters...

It was a report that came _____ Brooking Institute and in early 2000, 2 3, 4, something like that.

Yea, and it really identified cluster industries, composites for example, and that...

I think it reinforced and validated the ones that...

That had already been identified. And so the idea was really to try...and a lot of those...well you recall a stem focused, we have a need for stem focus. But the problem has been...lets say we grow some talent here, the policy piece comes into play as what is attractive to an industry to do start up in Maine.

One of the reasons why Mike Dubeak is so popular with that presentation going around the state is because it is counter to what most people expect. Most people expect just like you and your children that the economy is...that there is nothing happening in Maine, there are no jobs, they are elsewhere. And he stands up and defies that and says look, I came here, I have a big company, I am hiring but still...and the expectations don't always

match up with reality and we see for example, Maine has been known for manufacturing for how many years and everybody says well the mills are gone and there is no more manufacturing. Yet if you go into the manufacturing organizations they are looking to hire and they can't find people, because everybody thinks there are no jobs here and because the jobs that are here are more high tech than they use to be, it is computer numeric control where you do need more training but the flip side is it is clean manufacturing as opposed to the dirty manufacturing people remember from a generation ago and they don't want to go into it, so it is just a big irony. People won't go for the jobs because they think they are not here and there are employers trying to hire people for the jobs and they can't find anybody because people aren't coming forward.

So what I'm hearing is that there is a huge gap in misunderstanding what the work force needs really are and marrying that up with both personal aspirations and what is being taught...

...potential in the schools. And again that policy work to help Maine be an attractive place to do start up. We are not a state that has a huge infrastructure.

There are some really good support systems for start ups within the state but some of our bigger neighbors don't have and wish they have such as the Maine Technologies Institute, but you know from where I sit one of the things that I hear a reasonable amount is that when there are start ups who are trying to hire one of the problems is that there is not a deep enough pool, so with IT you probably have six or seven big organizations that if it doesn't work out and you are not in the right cultural center right it express you probably can go to _____ or you can go to one of these other firms. But in a lot of the other areas, if you go to work at _____ and you uproot your family and that doesn't work out, you may not have a lot of other options...and you may end up being underemployed or having to leave again.

I switched to another industry that we heard a presentation on this morning, hospitals and health care. Now that is a need in every community, rural, or whatever, there is a tremendous shortage of skilled health care, not just the trauma surgeons he was talking about and not only nurses, but nurses aids and the home health aids and there is a lot of careers there that are stem-based to a large degree and the more we can train, the more they will get good ;paying jobs and talk about steady and recession-proof and where the demographics are going, there are going to be more and more and more of them, still in this state we are not training enough of them. And if you talk about public policy and capacity why aren't we investing more in public policy and the capacity to train more.

So if there...I know we have a couple of good nursing program but as I understand it are they maxed out in capacity?

They are maxed out with long waiting lists.

Okay. Then because that is not what Mike is saying about IT in the computer science field. We have got a retention problem which may be if we could solve the retention problem...

What is coming in both cases, the pipe line there is not enough supply coming through the pipeline of skilled workers in both those cases.

And I think we have to peel back with the skill, what does that mean with the right skills. I would have been interested to have him dwell on that a little bit more, because I don't think it is just the content piece, it is really these practices that you know how to...whatever the environment you can employ and employ...

We have about ten more minutes to close up and I don't know if you can read my writing because I scribbled it from the chair but I can read them again to you too. These are the three parting questions for closure that were put forth for us to talk about and you could critique all of them or just one of them that you like and want to discuss the most. I can read them to you. The first one is how does this conversation inform our understanding what it looks like when we do stem teaching and learning well. The second is what do partnerships that support students look like. And the third one is given our different rolls what specific steps can we take that will support stem. So I don't know, people can start where you want and we can jump around a little bit too, but one of the questions being given the topic of this project could interest you more than others.

Maybe that first question needs a little re-visioning. Um, is this conversation under...

... informed or understanding of what it looks like when we do stem teaching and learning well.

Maybe it is when we understand what the needs of stem work force are and translate that into teaching. Something like that.

Yea, as well as higher ed opportunities, because the questions that are coming to my mind is what hiring and opportunities are there for student in Maine to fulfill the work force needs that you have, that is one; and what funding opportunities there are because there are a whole lot of kids out there who don't have the support of parents...

That's right.

...we will figure this out...

That's right, that's right.

I don't know, they are here on their own.

Yea, I have a daughter who is in PT school right now, pays her own _____ way and she knows we are behind her financially if she needs help, we will be there. There are a whole lot of kids who never ever consider that because they don't have _____...

They don't know how to navigate.

You can do this and we will provide as much support as we can, after having three kids in college. So you know those to me are two huge questions we need to ask and then create policies so that there are funding opportunities available. If your nursing programs are full, well we need more nursing programs, don't we? You know so how are we going to find additional _____ and opportunities because the reality is most of these work force positions that we are talking about...you are not ready at the end of high school, you probably are not ready after...for some positions after two years of a technical school. We are really looking for some of those higher level people.

But in these partnerships we talked about that where work force is really at the center and driving the conversation, this communications among all of these sectors that have a stake, yet in helping students kind of navigate the field of stem, this is one project that is sort of looking at piece of stem, a piece that is fairly relevant in terms of our own needs as a country and in terms of the work force that is needed to drive innovation. But there are...I mean the whole nursing...the health care I think is a legitimate, a very legitimate conversation.

And one of the things that strikes me as...there are sort of different levels of career where you expectations about moving outside of your community to pursue higher education is different. So if I am going to go to med school, am I not going to go to med school because we don't have a medical school in Maine. No. But I may well move back to Maine if that works well but am I go and uproot my family if my 30-year-old is thinking about...you know what, I want to do a career change and go into nursing. I had better have a program right here to support my needs. So I think there are sort of different levels of...depending on what those (both talking) whether it is an in place solution that is needed in terms of educational capacity or whether it is an aspirational issue where even if they go away you want them to be able to come back and that and then there are all those policy issues where the higher levels of health care where you have eight years of graduate school debt that you have to pay off and you aren't going to come back and work for \$50,000 a year in rural Maine.

I don't think so.

So that is where you have those policy things that actually make them work, where there is loan forgiveness and some of that if you will come and work in little communities for a while.

There is another piece that I see just looking at my children, is that my daughter got married and when you have two career people, that is a huge problem not only in rural Maine but it is a huge problem for starter companies in Orono. Because (both talking)

one Ph.D. who is going to come here but what is he going to do with his wife. Usually that is the what it is and what is he going to do with...sometimes it is what is she going to do with her husband. And they are ending up in England for them both to do their (both talking) So it is not how to I cover the debt but how do we stay together.

I would like to just jump back to the K-16. I _____ supporting of Rob Picture and recognizing that yes, I am an elementary school teacher who happens to have a science background and science degree but there are many elementary schools that _____ science or math phobic and _____ so what can we do to implement stem so that those fourth graders who are interested or could be captivated are captivated and stay captivated. And that takes partnerships with business and science and math industries to come in or to take kids through the experience.

And it has a little bit of the trickle down effect we were talking about where people start paying attention when they see that higher up that is a value. Parents start saying wait, if my child, you know want your child to stay in Maine or I want my child to have a job when they...and so why is it acceptable for an elementary school teacher to say I just never got math. Why is that acceptable. If the same teacher said I just never got reading, they would be fired immediately and...but if they can say...it is socially acceptable that is not really policy that is attitude but...

...culture...

Culture...and so we say wait, wait we got jobs. All of a sudden it is not acceptable to the parent for the teacher to say I just never got math.

That is interesting. Um, maybe there is a policy piece to that too.

That is what I am wondering.

You can be certified as a teacher.

Right, right, right, and what kind of math is required, what kind of understanding of science and...

I spent...while my children were in elementary school I spent an entire afternoon talking to all the teachers in the school, explained to them why you can't divide by zero because of papers that were coming home. And (all talking) and then my next child got to that grade and those papers were still coming home with fill out and what is 10 divided by zero and I am like...you are just like, we did have that conversation didn't we and...

We need to wrap up in just a couple minutes. No that is good, it is good conversation. I was wondering too, _____ you are already talking about it, are there any more specific steps you can think about and we need your recommendations and we can do that.

One of the policy recommendations I think that can happen, actually Vermont is currently...a high school student _____ math, any math will do. Our scores were so horrible that the commission made the recommendation that they had to have one year geometry, one year of algebra II and in the next couple of years I think we are going to require algebra II and. So when we talk that teachers were not prepared if they get it in their K-12 system they should be better prepared when they go to teach it, although the _____ pieces are really important in order to teach well, but rather than having very loose general requirements for high school subjects becoming more specific in terms of what do we need to do to have what we think as the 21st century.

Are there any flexibility in the current school structure to have interdisciplinary forces that would count toward either double period classes, but I don't know how that would count toward building a couple requirements so you might have a biology/math course or a physics/math course that is together where you are learning math tools as you are learning the science and both requirements are being met.

I think there could be in a large number of schools that now work on the block system where the classes are _____.

My kids did a precal/physics combo with the physics and the math teacher together.

Yea. And I still think there are some wrinkles with the State Department of Education in terms of what is acceptable at the state level, to go back you have to have so many units in...

The _____ units...

Right and so that is another area of policy to work on that those units and what we consider a unit have to be reformed, revised, to reflect the reality of bringing the sciences together including the social sciences.

So moving to an efficiency-based graduation where here is what you got to know by the time you get to graduation...

That's right and how in your courses...to achieve that...

And you are solving problems. I was not talking to stupid people but maybe the math phobia gets in the way but I was like, it doesn't make any sense if 10 divided by...if something divided by zero equals something that means zero times something equals 10. And the logic of it, just the logic of it...

I think what you are getting at is something whether you can stem education which is for, I think, many decades we didn't have much of an expectation that teachers be educated in content to talk about science, to talk about other things, teachers would go into teaching because they liked kids, because they were good with kids, and content was not emphasized.

With the exception of reading, probably...

...with he accepted reading...

And reading has really remained the mainstay.

Especially for K-6 certification.

It is so, again, and there isn't the sort of heft with the departments of education to really insist on more. Some stated have gone in that direction and others...

So there is still a huge shortage of stem teachers already and it is going to be exacerbated over the next decade as I understand it with retirement. But I also understand when we have people retire here who have been very successful in stem careers, it is incredibly hard for them to actually get qualified to be a teacher. It is like go back to school for two years and I don't disagree that there is in fact the professionalism of education and how to teach, there is a skill set to be learned there but there may well be some important policy work to be done there...

(unable to understand).

It is somehow accommodate and bring them into the system in a different way.

There are a lot of things that they have learned in their careers you would use in the classroom, you know, classroom management, communicating how to get people to do what you want in a pleasant way.

The other thing we are pushing for that wouldn't be an endorsement but some kind of note on your licence that actually you've taken more math courses than you needed to so you would be more likely to be a math specialist. We had a talk about it in terms of science but really what you are required to take is really enough. The other thing K-6, the elementary grades. What about some specialization. I use to think anybody could learn to teach science after being a science specialist for five years in the K-6 system I don't believe that anymore. The first person who does not like to get dirty is never going to like the stem table, never. (all laughing) Why make her do that and why don't elementary teachers specialize more and get to teach math twice in a day, you have to get better at what you do that you are best at and when there is professional development. I only need half the teachers to buy the math content that they need and I will be working with the others _____ social studies. Whatever, but they have been trying to be experts at everything and (both talking) lets look at the system. What is not working here and lets try something a little different and don't tell me little kids can't go to more than one teacher in a day. I worked in daycare, I was the morning person. Somebody else was in the afternoon. Lets switch classes starting in first grade. I switch classes for study starting in first grade.

Perhaps we should publish a book called something like all I needed to learn to teach kindergarten I learned in real life. (all talking and laughing).

Maine kids in elementary school don't switch classes, so that they are with different teachers?

Generally as a rule not until 5th grade.

In 5th grade we started...(much background noise).

_____ so you kind of know what those are. Just like the...

Thanks for just joining in and we covered a lot of ground but I think we really cracked open a lot of policies.

I at least understand what we are trying to do.

Oh, good, oh good.

What part of New York State?

For the past 20 years roughly, I was at Syracuse.