

2015 HOUSE EDUCATION

HB 1393

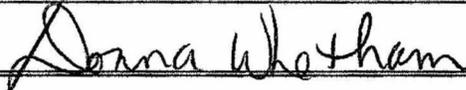
2015 HOUSE STANDING COMMITTEE MINUTES

Education Committee
Pioneer Room, State Capitol

HB 1393
1/26/2015
22567

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

To provide an appropriation for a science, technology, engineering, and mathematics advancement initiative.

Attachment # 1-7

Minutes:

Chairman Nathe: opened the hearing on HB 1393.

Rep Meier: District 32, introduced HB 1393 (See attachment # 1,2) in support.

Chairman Nathe: Did we fund this last session?

Rep Meier: Yes we did and the program has been very successful. It will go through Career and Tech Ed this time.

Wayne Kutzer: Director of the Department of CTE, in support of HB 1393 (4:00)- (7:17)
(See Attachment #3)

Rep Rohr: So if we did not pass this bill will this would this program go away?

Wayne Kutzer: The programs that I handed out will not go away.

Chairman Nathe: The \$100,000 dollars will that be used for the innovative grant and the STEM matching grants?

Wayne Kutzer: The STEM innovation grants have funding behind them, what I wanted to do is provide for a statewide conference and for what they call STEM days.

Chairman Nathe: If this doesn't pass is there money in your budget to pay for the statewide conference.

Wayne Kutzer: No there is not.

Rep Hunsakor: Can you expand what happens in the STEM conference.

Wayne Kutzer: The conference is an annual event, the first one was held last year, it brings together teachers and speaker on how to use STEM and how to integrate STEM in your curriculum. Lots of activities for students.

Matthew Leiphon: on the management team of North Dakota STEM Network, in support of HB 1393. (8:00- 16:00) (See attachment #4).

Rep Schreiber Beck: This would be the second year for receiving funding, is that correct?

Matthew Leiphon: I have only been working with this for a year, I do know they passed \$160,000 in a grant through CTE. And this time it would be a \$100,000 dollars.

Rep Schreiber Beck: Has there been thoughts about working across state lines?

Matthew Leiphon: Yes, we will be bringing together other states and panels from there to talk about STEM.

Rep Rohr: I was looking at the matching grants, how do we get into the rural schools?

Matthew Leiphon: I don't know, but for our upcoming summit we have an opportunity to meet with our agricultural leaders. There is where we are hoping to get industry, education and students together to build on that and discuss successful programs. There are jobs that need to be filled out there.

Chairman Nathe: Are you seeing these events growing every year?

Matthew Leiphon: We are hoping to get more people this year. We want to have the focus on industry and educators talking together, connecting together, it is truly a network.

Chairman Nathe: I feel the development of that network is very urgent, I think you are on the right path.

Matthew Leiphon: One of the challenges is making those connections.

Dr. Robert Pawloski: STEM Field Coordinator at UND: (20:12- 23:25) (See Attachment #5). In support of HB 1393.

Paul Keidel: Vice Chairman of ND STEM Network and STEM Coordinator of the Missouri River Education Cooperative. In support of HB 1393. (23:40- 27:35) (See Attachment #6).

Chairman Nathe: Could you speak to graduation rates?

Paul Keidel: I see the success and increase of graduation rates with STEM program involved in that school. They integrated STEM strategies in those schools.

Laney Herauf: GNDC (See attachment #7) (29:27-30:00) In support of HB 1393. We do urge a do pass on this bill.

Chairman Nathe: Any support of HB 1393? Seeing none. Any opposition to HB 1393? Seeing none closed the hearing on HB 1393.

Vice Chairman Schatz: Moved Do Pass with rereferral to Appropriations.

Rep. Ben Koppelman: Seconded

Chairman Nathe: I think this is a vitally important program, especially to develop the workforce needs around the state and I heartily support this bill.

A Roll Call Vote was taken. Yes: 13 No: 0 Absent: 0

Rep. Hunsakor: Will carry the bill.

Date: 1-26-15
 Roll Call Vote #: 1

**2015 HOUSE STANDING COMMITTEE
 ROLL CALL VOTES
 BILL/RESOLUTION NO. 1393**

House Education Committee

Subcommittee

Amendment LC# or Description: _____

Recommendation: Adopt Amendment
 Do Pass Do Not Pass Without Committee Recommendation
 As Amended Rerefer to Appropriations
 Place on Consent Calendar
 Other Actions: Reconsider _____

Motion Made By Rep Schatz Seconded By Rep Koppleman

Representatives	Yes	No	Representatives	Yes	No
Chairman Nathe	✓		Rep. Hunskor	✓	
Vice Chairman Schatz	✓		Rep. Kelsh	✓	
Rep. Dennis Johnson	✓		Rep. Mock	✓	
Rep. B. Koppelman	✓				
Rep. Looyen	✓				
Rep. Meier	✓				
Rep. Olson	✓				
Rep. Rohr	✓				
Rep. Schreiber Beck	✓				
Rep. Zubke	✓				

Total (Yes) 13 No 0

Absent 0

Floor Assignment Rep Hunskor

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HB 1393: Education Committee (Rep. Nathe, Chairman) recommends DO PASS and BE REREFERRED to the Appropriations Committee (13 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). HB 1393 was rereferred to the Appropriations Committee.

2015 HOUSE APPROPRIATIONS

HB 1393

2015 HOUSE STANDING COMMITTEE MINUTES

Appropriations Committee
Roughrider Room, State Capitol

HB 1393
2/12/2015
23798

- Subcommittee
 Conference Committee

Mary Brucker

Explanation or reason for introduction of bill/resolution:

Appropriation for a science, technology, engineering, and mathematics advancement initiative.

Minutes:

No attachments

Mike Nathe, Chairman of the Education Committee: This bill has to do with STEM Network to support STEM education in the k-12 arena. The fiscal note is \$100,000 and that would be used to go through CTE for state-wide conferences, k-12 events in the four regions, science fairs, and those sorts of things to promote STEM in the state. Right now CTE doesn't have any money in their budget to do this. Our committee is a strong supporter of STEM and was the reason we passed it out.

Chairman Jeff Delzer: Did you get a list of how many and the cost per each? Last time I think we passed this at \$50,000. I know there was even consternation with that amount.

Representative Nathe: I have a rough outline where it talks about the 2016 North Dakota STEM Summit and it contains the issues for what the \$100,000 would cover.

Chairman Jeff Delzer: Last time we got a suggested budget. Did that come before your committee yet?

Representative Nathe: I don't believe so.

Chairman Delzer: Brady, let's ask him for that.

Representative Boening: You said we passed \$50,000 last session for this program?

Chairman Jeff Delzer: There was a certain amount of money we passed and I thought it was \$50,000.

Representative Boening: Why didn't the CTE put it into their budget this year?

Chairman Jeff Delzer: I suppose they thought it would get funded again. I guess you'd have to ask Becky, OMB. Can you find that out for us? It's a valid question because if it

was such a good program you would have thought they would have requested an expansion of it.

Representative Dosch: It was either \$150,000 or \$160,000 that we put in for this. It was my understanding that the bill sponsor said they are visiting this CTE need to incorporate this into their budget for their administrative end of it.

Chairman Jeff Delzer: Do we have any kind of report from CTE about how well or if this made any difference in the number of people trying to get in to STEM?

Representative Nathe: I don't have that.

Representative Monson: We have CTE's budget but we didn't ask; it wasn't in the budget.

Chairman Jeff Delzer: Brady, would you contact them with that question for us please?

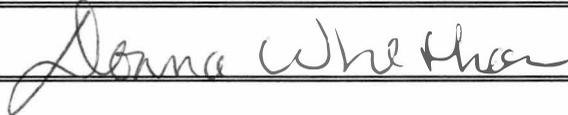
2015 HOUSE STANDING COMMITTEE MINUTES

Appropriations Committee
Roughrider Room, State Capitol

HB 1393
2/18/2015
24106

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

To provide an appropriation for a science, technology, engineering and math

Minutes:

Chairman Jeff Delzer: opened the hearing on HB 1393. We added \$100,000 for STEM(Science, Technology, Engineering, Math). Representative Dosch has some information of who would get and what they would expect to use the money for.

Representative Dosch: Spoke HB 1393. This funding is designated for the Career & Technical Education (CTE) to help support the North Dakota STEM network by providing partial funding for the annual STEM Conference and 4-5 Regional STEM days each year for K-12 students. They would go to a regional site and participate in the design activities to reinforce the STEM concepts that they are learning in their schools. It is to provide networking opportunities for the students to show what they have learned.

Chairman Jeff Delzer: Where do they get their funding because this is just an addition to?

Representative Dosch: I believe it is general fund dollars to reinforce the millions that we do spend on the STEM network over the state.

Chairman Jeff Delzer: But where do we fund that at, in CTE?

Becky Deichert: (OMB) I am not sure where STEM is all included in budget wise, but Tammy Dolan had indicated that CTE had received one-time funding in the current biennium for this but they weren't expecting any more apparently.

Brady Larson: Legislative Analyst: It is my understanding that the funds would go to CTE and they would coordinate these activities.

Chairman Jeff Delzer: Do they have a list of what they are going to do with it, the actual dollars?

Representative Dosch: Last time it was to get the program and network together and that is accomplished now and they can now go out and do the regional conferences which was one of their goals. Last time we funded \$160,000 to get it set up and going and this is to help implement it.

Chairman Jeff Delzer: Who is actually doing it? Who are they hiring to do it?

Representative Dosch: I don't know.

Vice Chairman Keith Kempenich: **Motion Do Pass on HB 1393.**

Representative Dosch: **seconded.**

Chairman Jeff Delzer: With our current situation I hope it gets to the point where they don't have to come for funding for this. I don't know why they get it. I don't know exactly what we spend because CTE is a big budget and I almost think there should be some money in there. Any other discussion on the motion for the Do Pass on HB 1393?

Representative Monson: The CTE budget is basically a pass through place, grant money goes in and out. There is no money in the CTE budget right now for the STEM.

Chairman Jeff Delzer: There is none of it being used in conjunction with this?

Representative Monson: There is no line item in CTE that specified STEM.

Chairman Jeff Delzer: Did you get into their operating money and go through all that?

Representative Monson: It is in the grant money if it is in there but there is no grant line and operating would not have anything to do with this. Last year it was one-time funding last year; that went in and went out. Where the money went I don't know, we didn't dig into because it had zero money asked for in it. This is a stand-alone bill.

A Roll Call Vote was taken. Yes: 12 No: 11 Absent: 0. Motion Carried.

Representative Dosch: **will carry the bill.**

REPORT OF STANDING COMMITTEE

HB 1393: Appropriations Committee (Rep. Delzer, Chairman) recommends DO PASS
(12 YEAS, 11 NAYS, 0 ABSENT AND NOT VOTING). HB 1393 was placed on the
Eleventh order on the calendar.

2015 SENATE EDUCATION

HB 1393

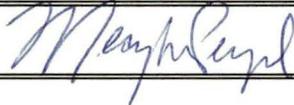
2015 SENATE STANDING COMMITTEE MINUTES

Education Committee
Missouri River Room, State Capitol

HB 1393
3/9/2015
Job # 24477(48:12)

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

INITIAL HEARING

to provide an appropriation for a science, technology, engineering, and mathematics advancement initiative

Minutes:

6 Attachments

Chairman Flakoll called the committee to order at 10:00am with all committee members present.

Lisa Meier, District 32 Representative (*see attachment #1*)

Vice Chairman Rust: Was \$100,000 the amount in the original bill?

Representative Meier: Yes it was.

(2:55) **Wayne Kutzer**, Director of the Department of Career and Technical Education (*see attachment #2, 2a, 2b*)

Senator Schaible: We started this last biennium with a start-up fund. The hope was to get private industry partnerships to pay for this and it would be an infusion to complete that. Is that correct?

Kutzer: Correct. Originally when it was funded last biennium, the dollars went to the North Dakota STEM network. They hired a management company to help run the dollars and and try to raise funds from industry. They've started that process and very minimal dollars have been raised at this point. Hopefully this will help extend it so those dollars could be raised.

Senator Schaible: Are we well on our way to becoming self-sufficient on this?

Kutzer: We are on our way. The ND STEM network is finishing up the process of becoming a 501c3 so that they can take in donations for employer tax considerations. The \$100,000 is directly for the activities.

Senator Marcellais: Do you have an overall number of how many students that have been involved in this program state-wide?

Kutzer: We do not. STEM activities can be so broad. The intent of the ND STEM network is to try to provide some coordination and tracking of what types of events are going on. That way we know what schools are doing what in the different areas of STEM so it can be replicated in other parts of the state.

Senator Davison: Is there any dollars in your CT budget for ongoing administration for the STEM network and are you asking for any?

Kutzer: We are not asking for any dollars for ongoing administration.

Senator Davison: There's \$160,000 in the CT budget for it.

Kutzer: Those were one time funds.

Senator Davison: You're not asking for those funds back in the CT budget as an ongoing appropriation?

Kutzer: Correct.

Senator Davison: Is the \$100,000 specifically for projects in itself? It's not to fund the administration of the STEM network?

Kutzer: Correct, just for activities, no administration.

Chairman Flakoll: How about capacity building? Are you doing anything to allow more educators to have skill sets in the STEM area?

Kutzer: Absolutely. We provide ongoing professional development for teachers in STEM methodologies and teach them how activities can integrate into curriculum and become a STEM activity.

(11:50) **Matthew Leiphon**, Management team of the ND STEM network
(see attachment #3-3a)

(18:55) **Stacey Breuer**, Human Resources Manager for Bobcat (see attachment #4)

Senator Marcellais: Are there any plans for Bobcat to reach out to the rural areas?

Breuer: We do that all the time with various recruiting efforts. We don't necessarily go out and recruit high school students, but we recruit them once they get to the colleges.

Senator Marcellais: Have you been involved with the tribal colleges?

Breuer: We have done some outreach with the tribal colleges, but there is definitely more that we need to do.

Chairman Flakoll: FTC stands for FIRST Tech Challenge?

Breuer: I believe that is correct.

Chairman Flakoll: Your organization has done some efforts to "teach the teacher". As an example you had someone from West Fargo there as a sort of internship to understand the structure and function of your organization. Are you familiar with that?

Breuer: That program is called "Teachers in Industry". We had some teachers in our West Fargo and Bismarck Locations this past year. It is a good month-long experience for the teachers and it is considered an internship. They are assigned to and shadow various individuals in the organization.

Chairman Flakoll: There seems to be gender separation in STEM areas. From an HR standpoint, are you seeing more balanced applicants now with these interest and recruiting efforts?

Breuer: There has been no significant increase for females or minorities in the last 15 years that I have been hiring engineers. Various disciplines of engineering have more females versus males and have stayed steady over the years, but there is still a lot of work to be done.

(31:55) Mindy Grant de Herrera, West Fargo mother (see attachment #5)

M. Herrera: West Fargo is a big district and we do have a lot more resources than many of you. For that reason alone, it is important that the North Dakota STEM network continues to be funded. We need to be able to reach out to those areas and take advantage of this. There are many businesses interested in promoting this to get children educated in the way that they need them to be.

(35) Isabetta Bleu Herrera, sophomore in the West Fargo STEM program

I. Herrera: I have been in this program since 2010. The way they've taught us has immensely helped me to form skills that I use in everyday life as well as professional settings. As I continue to go through STEM and high school, I see the enthusiasm and hard work that the teachers are putting into the STEM program, but I also see the need for more STEM methodology. Our instructors need more support in education so that they can continue to provide us students with more quality mentoring and support through the STEM program.

Senator Davison: Did you attend the West Fargo Middle School that focused on STEM?

I. Herrera: Yes I did.

Senator Davison: What was your favorite part of that program?

I. Herrera: In 7th grade we began to focus in on the whole STEM and interdisciplinary classes. We had many STEM days when we would do a whole project in one day and then present it to our teachers and members of the community the next day. That was an interesting and unique experience.

Senator Davison: When you attended the middle school, did you feel like it was more student-driven or did the teachers drive the classroom?

I. Herrera: It was equal. Many of the students and teachers had a mentor relationship. They drove and supported us, but we also pursued our own information with them there to help us.

Chairman Flakoll: How many years have you been exposed to this?

I. Herrera: This will be my fifth year. I'm in 10th grade now and I started in 6th grade, but they started talking to us about it in 5th grade.

Chairman Flakoll: Are these activities group efforts or more individualized?

I. Herrera: Most of our projects are group-based and hands-on projects. We go out into the community to work with local professionals in the fields that our projects focus on. It is group-oriented with the students, the teachers and the community.

Chairman Flakoll: Are there any projects that have impacted you greatly?

I. Herrera: There was a project I remember called "Yourville". We chose a region in Africa that was struggling with water management. We went to Moore engineering and they taught us how the civil engineering worked in West Fargo for water management. We also

went to one of the lakes in town, gathered water and walked back to the school to see what it was like in Africa. Throughout the project we got to build our own version of a town and how we could help them introduce water management the way we had it in West Fargo. At the end the teachers and the community got to choose their favorite group's solution and then that group got to donate several hundred dollars to a female entrepreneur that lives in Africa. My group won, so I feel it was a real impact that we had and that will stick with me forever.

Vice Chairman Rust: Have you thought about where you want to go to school after high school and what field you want to go into?

I. Herrera: I don't know exactly where I want to go yet, but even if I don't end up going into Science or Math, it has definitely helped me in whatever I do.

(42:50) **David DeMuth Jr.**, Professor of Physics at Valley City State University
(see attachment #6)

(45:55) **Jill Schlenker**, Jamestown Information Technology specialist

Schlenker: I stand in support of this bill because of a recent event that occurred in Jamestown called "Techsaavy". It is an event sponsored by the American Association of University Women to encourage girls grades 6-9 to become more interested in STEM related fields. During this event, I presented a computer programming class and I asked one of the students what they wanted to be when she grew up. She told me she wanted to be a cosmetologist. I asked her if she ever thought about creating a Smartphone application for her future customers- perhaps creating a way to take a picture of themselves and try on a new hairstyle or color without having to actually doing it. The light in her eyes from the excitement was very encouraging for me. I would ask that you support this bill so we can continue to see the lights go on in everyone's eyes once they understand what they can accomplish with technology.

Senator Marcellais makes a motion for a DO PASS and rereferred to Appropriations.
Senator Oban seconds the motion.

A vote was taken: 6 yeas, 0 nays, 0 absent.
The motion carries 6-0.

Senator Schaible will carry the bill.

REPORT OF STANDING COMMITTEE

HB 1393: Education Committee (Sen. Flakoll, Chairman) recommends DO PASS and BE REREFERRED to the Appropriations Committee (6 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). HB 1393 was rereferred to the Appropriations Committee.

2015 SENATE APPROPRIATIONS

HB 1393

2015 SENATE STANDING COMMITTEE MINUTES

Appropriations Committee Harvest Room, State Capitol

HB 1393
3/17/2015
Job # 24948

- Subcommittee
 Conference Committee

Committee Clerk Signature

Kathie Oliver for Rose Leving

Explanation or reason for introduction of bill/resolution:

A BILL for an Act to provide an appropriation for a science, technology, engineering, and mathematics advancement initiative.

Minutes:

Attachment 1 - 5

Legislative Council - Brady Larson
OMB - Tammy Dolan

Chairman Holmberg called the committee to order on HB 1393.

Representative Lisa Meier, District 32:

Testified in favor of HB 1393. She hadn't planned to testify and was there to answer questions, but did want to go on record as favoring the bill.

Senator Carlisle: Why a separate bill?

Lisa Meier: Last session we had a bill very similar to this and this is just a continuation of this. Why it is not in another bill I do not know but this bill does a lot.

Matthew Leiphon, Management Team member for North Dakota STEM Network:

Testified in favor of HB 1393. Testimony - Attachment 1
The State of STEM in 2014 and ND STEM Network Profile - Attachment 2

(8:44) Senator Bowman: Where is exactly the \$100,000 going to go? Who decides where it goes?

Matthew Leiphon: We will be working with CTE to make sure funding is used appropriately. Some of the funds will be used to bring industry, business and students together. Transparency is important to make sure they are used effectively.

Wayne Kutzer, Director, Department of Career and Technical Education:

Testified in favor of HB 1393. Testimony - Attachment 3.

(13:03) Chairman Holmberg if this committee liked the bill, it barely got out of the House, is it better strategically to be put into the budget of your agency or as a free standing bill.

Wayne Kutzer: I'd be happy to have it in our budget, last session it was a standalone bill and there was one-time dollars put into our fund.

Chairman Holmberg: The subcommittee will be the same CTE (Senators Erbele, Holmberg, Heckaman)

Senator Bowman: How much money do you have to work with currently? Do you create a pool of money?

Wayne Kutzer: We have dollars; CTE has been STEM all along. A lot of types of activities are things we supply to schools the administration of this we'll be able to incorporate into our agency with the staffing that we have.

Senator Carlisle: On page 9 of bill, the Governor put \$700,000 for new and expanding programs. If the subcommittee recommends between 0 and 100 it could easily go into your budget rather than into the Century Code.

Wayne Kutzer: On the one caveat that it doesn't remove dollars that we have in our budget.

Senator G. Lee: You said it was a stand-alone bill last session. What was dollar amount?

Wayne Kutzer: \$160,000 with \$140,000 - a total of \$300,000. They were one time funding and went away. We want \$100,000 is just directed at the two conferences and STEM day activities for students.

Senator G. Lee: How many dollars in your budget for STEM?

Wayne Kutzer: The administrative dollars came to us, but have since gone away. These dollars stand alone. We have dollars in support of programming. For these activities,

Senator G. Lee: Do you have specific dollars that goes towards STEM?

Wayne Kutzer: \$600,000 that goes into different types of activities.

Paul Keidel, Vice Chairman of the ND STEM Network and STEM Coordinator of Missouri River Education Cooperative:

Testified in favor of HB 1393. Testimony - Attachment 4

Rebecca Engelman, Director, Arts in Education, ND Council on the Arts and Board Member of ND STEM Network: Testified in favor of HB 1393.

Testimony - Attachment 5.

(26:37) Senator Bowman: Are the STEM students involved in the robotics that were on display.

Rebecca Engelman: Yes, those are some of our STEM students but it also reaches beyond that area. We need STEM literate students, teachers and every area we are in. We all need to be STEM literate. It's been a wonderful way to come together to meet the needs of students.

Senator G. Lee (to Wayne Kutzer): You mentioned \$600,000 in budget for STEM in 2015-2017 budgets. What is it in 2-13-2015?

Wayne Kutzer: It was the same amount.

Senator G. Lee: Did that include the \$300,000 that was in the other bill?

(28:50) Wayne Kutzer: The current biennium was \$900,000 and the future biennium will be \$600,000.

There was no further testimony and co-Chairman Bowman closed the hearing on HB 1393.

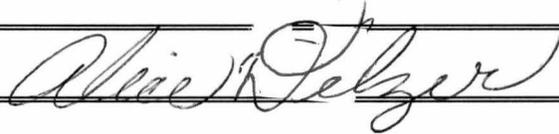
2015 SENATE STANDING COMMITTEE MINUTES

Appropriations Committee Harvest Room, State Capitol

HB 1393
3/26/2015
Job # 25485

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

A Subcommittee hearing for STEM

Minutes:

No testimony submitted

Chairman Erbele called the subcommittee hearing in order on Thursday, March 26, 2015 at 2:45 pm in the Harvest Room. All subcommittee members were present: Chairman Erbele, Senator Holmberg and Senator Heckaman. Mr. Kutzer is present. Tammy Dolan, OMB and Sean Smith, Legislative Council, were also present.

Wayne Kutzer, Director of Career and Tech Ed. is for STEM . if we would be willing to put this in our budget. We would be as long as we have control of the dollars and being that we would be responsible for that. Last session, the STEM received about \$300,000 all through our budget but they were pass through dollars that went out to the stem network. When they came back, they had a larger budget, works very closely with Representative Meier. She was the one we came up with the \$100,000. So the \$100,000 in this budget would help pay for 2 conferences, one each year in the biennium for STEM and 4 to 5 regional STEM Day activities across the state for K-12 students. That was the intent of the \$100,000. Our agency would do all the administrative work behind helping establish the conference and all those types of things. .

Senator Erbele You are just a holder and manager of those dollars.

Mr. Kutzer: Yes. It doesn't affect any other line in the budget.

Senator Erbele asked if this had a favorable review from the House. He was told yes.

Chairman Holmberg we either recommend yes or no.

Senator Erbele stated watch the board for when we will come back together. The subcommittee hearing on HB 1393 was closed

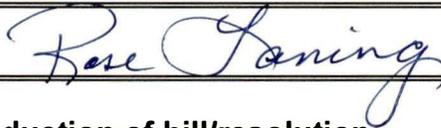
2015 SENATE STANDING COMMITTEE MINUTES

Appropriations Committee
Harvest Room, State Capitol

HB 1393
4/8/2015
Job # 25903

- Subcommittee
 Conference Committee

Committee Clerk Signature



Explanation or reason for introduction of bill/resolution:

A BILL for an Act to provide an appropriation for a science, technology, engineering, and mathematics advancement initiative.

Minutes:

Senator Erbele said this is just an up or down vote, whether you support it or not, it's \$100,000 to the Career and Tech Ed people to partially fund two conferences per year for teachers and administrators and then they do 4-5 regional STEM day activities for K-12 students.

Senator Erbele moved Do Pass on HB1393.
Senator Heckaman seconded.

A Roll Call vote was taken. Yea: 13 Nay: 0 Absent: 0

The bill goes back to the Education Committee and **Senator Schaible** will carry the bill on the floor.

Date: 4-8-15
 Roll Call Vote #: 1

**2015 SENATE STANDING COMMITTEE
 ROLL CALL VOTES
 BILL/RESOLUTION NO. 1393**

Senate Appropriations Committee
 Subcommittee

Amendment LC# or Description: _____

- Recommendation: Adopt Amendment
 Do Pass Do Not Pass Without Committee Recommendation
 As Amended Rerefer to Appropriations
 Place on Consent Calendar
 Other Actions: Reconsider _____

Motion Made By Erbele Seconded By Heckaman

Senators	Yes	No	Senators	Yes	No
Chairman Holmberg	✓		Senator Heckaman	✓	
Senator Bowman	✓		Senator Mathern	✓	
Senator Krebsbach	✓		Senator O'Connell	✓	
Senator Carlisle	✓		Senator Robinson	✓	
Senator Sorvaag	✓				
Senator G. Lee	✓				
Senator Kilzer	✓				
Senator Erbele	✓				
Senator Wanzek	✓				

Total (Yes) 13 No 0

Absent 0

Floor Assignment Scholarship Education

If the vote is on an amendment, briefly indicate intent:

REPORT OF STANDING COMMITTEE

HB 1393: Appropriations Committee (Sen. Holmberg, Chairman) recommends DO PASS (13 YEAS, 0 NAYS, 0 ABSENT AND NOT VOTING). HB 1393 was placed on the Fourteenth order on the calendar.

2015 TESTIMONY

HB 1393

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ND STEM Network – Legislative Request MEMO

1/26/15

January 13, 2015

To: Rep. Lisa Meier, Sen. Larry Robinson

From: Ryan Aasheim & Matthew Leiphon, ND STEM Network

Cc: Don Fischer, Paul Keidel, Angela Bartholomay, Tifanie Gelinski, Tim Young, David DeMuth, Amanda Remyse, Rebecca Engleman, and Delore Zimmerman

Re: ND STEM Network

North Dakota led the nation in growth of STEM jobs between 2004 and 2014 adding 37.1% to its STEM workforce of engineers, technicians, and scientists. Yet STEM jobs represent just 3.3% of all jobs in North Dakota, ranking 44th among all states. Despite this growth, North Dakota remains towards the bottom for concentration of STEM jobs. It is estimated that the state will need to fill 15,000 highly-skilled STEM jobs by 2018.

Teachers, educators, and STEM practitioners are active in pockets of the state. Discussions with North Dakota employers and the statistics suggest that we need to continue to elevate the delivery and prevalence of STEM education and activities throughout the state. An educated STEM workforce is important in creating a robust diversified economy. The best way to meet our workforce needs and to create opportunity for our citizens is to develop a pipeline of talent from within.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a nexus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network in the process of building a foundation for something that has taken years and decades to build in other states. The efforts to add structure to the network over the past 10 months are supporting teachers in their ongoing delivery of STEM education and strengthening existing and forging new connections with partners in industry.

STEM NETWORK 2014

The STEM Network has been established as an independent organization to leverage and enhance North Dakota's existing investments in K12 and higher education and in workforce and economic development. Over the last 12 months, the Network has been involved in several activities to support ongoing STEM education efforts and to build connections between the business and the education communities:

- **2014 STEM Summit** – attended by close to 150 educators, business leaders, economic developers, and industry representatives.
 - o Provided a venue for sharing of efforts between educators and employers
 - o STEM Professional Development workshops for educators
 - o Nationally renowned experts and leaders showcasing best practices and techniques for STEM education
 - o Forged connections between the state's top STEM teachers who are often isolated in their home school districts
- Hosted **Four Regional Network meetings** throughout the state
 - o Attended by educators, private business people, economic development professionals, and state lawmakers

- Showcase innovated STEM programs in each region
- Enlighten economic developers and industry as to what is going on in classrooms and afterschool activities and how they can engage and support in a meaningful way
- Disseminate current labor market information about state STEM job trends
- Incorporated the STEM Network as a ND non-profit and working towards federal 501c3 status
- Performed 1-on-1 outreach meetings with employers advocating for industry support of STEM initiatives and advancement of STEM workforce development
- Public support and communications efforts
 - Next Generation Science Standards white paper
 - Shared STEM news, grant and resource opportunities, and other information across the state
- Produced economic, workforce, and data analysis reports by industry and occupation for ND regions and statewide to get data in the hands of state policymakers. Information was delivered in written reports and in-person presentations. Topics in 2014 included North Dakota STEM Economy Report, ND Oil & Gas Extraction Employment Summary, Women in Construction Across the Great Plains, UAS Industry Analysis, Minot Economic and Workforce Analysis, and various Regional Analyses.

STEM NETWORK GOALS

There are many great STEM education activities and resources available in pockets across the state. Several districts host FIRST and Bison Best Robotics teams and other afterschool activities. Other districts are delivering STEM classroom curriculum like Project Lead the Way, classroom career development days like "You're Hired", professional development workshops delivered by universities in the state and a host of other activities. The innovative Teachers in Industry program is placing teachers in a business for one month each summer.

With so many different activities and entities operating independently around the state, there is a degree of fragmentation of efforts in silos of activity. North Dakota is a small state, but it can use its size to its benefit by focusing on collaboration and sharing of ideas.

The STEM Network's goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that coordinate private and public sector resources and make them easier to access. We hope to:

- ⇒ Grow the level of industry engagement with education and workforce training and create succinct linkages between educators and industry
- ⇒ Connect teachers with teachers to share curriculum and program ideas across the state
- ⇒ Use industry support as a model for ND STEM Network long-term sustainability, supported by grant funding, donations, and other private sources of support and funding
- ⇒ Eliminate or reduce the fragmentation of activities, duplication of efforts, and increase the efficiency of resources and investments
- ⇒ Improve access to STEM career information among parents, students, and guidance professionals
- ⇒ Improve access to labor market data to support curriculum design, workforce development policy, and talent recruitment
- ⇒ Align industry workforce needs and challenges with development of education activities
- ⇒ Enhance the experience of North Dakota K-12 students using STEM education principles such as problem-based learning, multidisciplinary curriculum, and hands-on experiences
- ⇒ Complement other ongoing state workforce and educational development programs, working in partnership to improve STEM awareness and better prepare North Dakota students for the workforce

STEM NETWORK ACTIVITIES 2015-2016

Working to achieve its goals, the ND STEM Network will engage in the following primary activities.

Create Industry-Education Exchanges to connect employers with educators. The Exchange format insures that industry is represented and connected to elementary, high school, tech training, classroom activity, and after school activities and higher education STEM curriculum. The format provides educators with a chance to leverage connections with businesses to enhance student experiences and to increase business support of education programs. The Exchanges will comprise three main activities:

- Statewide industry roundtable meetings facilitating face-to-face discussions between STEM businesses, regional leaders, and educators.
- NDSTEMExchange.org – an online information source containing a STEM resource inventory organized by industry. The online tool will centralize information about existing STEM education, career development, and training activities already happening in the state. The site will aim to be a place where teachers can connect to business, teachers can find inspiring ideas from other teachers, and businesses can identify chances to work with educators in their region or industry.
- Interactive map of state STEM resources. This interactive map will allow parents, educators, industry partners, to locate STEM projects and resources in their region of the state. For instance an industry user may select a specific tab to find teachers interested in business mentorships.

2016 North Dakota STEM Summit. The STEM Summit is a statewide event that provides a face-to-face platform for our STEM community to connect. The event highlights the best STEM programs and practices happening in North Dakota, offers technical sessions for educators, and features exhibits and sessions about business-education connections.

STEM Economy Data for Decision Making. The ND STEM Network will continue to provide on-demand analysis of state trends and emerging job opportunities. The network will publish focused data reports and be available for in person presentations as needed by education and workforce leaders and policymakers.

Continue Regional STEM Network Meetings. The regional STEM Network meetings provide a chance to showcase what's happening in each region in more depth. Half-day regional meetings in 2014 were attended by K-12 teachers, higher education representatives, workforce and economic developers, chamber of commerce representatives, and many private businesses. These meetings showcase the STEM issues most important to each region and offer a chance to connect with new local partners outside of the STEM Summit. The STEM Network will coordinate two regional meetings in each region in the 2015-2017 biennium.

STEM Days for K-12 Students. Student engagement is critically important to ensure more high school graduates pursuing STEM professions. STEM Days are interactive events for 7th and 8th grade students to expose them to science and technology. The STEM Network will work with regional leaders to coordinate one event per year in each of the four ND STEM Network regions and one in partnership with the state's Native American Tribes. These events are modeled after the recent Tech Savvy and STEMtastic Jamestown! Events supported by the American Association of University Women and coordinated by the American Heart Association of Jamestown, the Jamestown/Stutsman Economic Development Corporation, the United State Geological Survey, the University of Jamestown, and the Great Plains STEM Education Center at Valley City State University, influencing over 360 7th and 8th grade students, and 18 teachers and paraprofessionals from those same grades.

Fundraising and Grantwriting. In order to assure the long term sustainability of the project, the Network will seek to access resources from private and other outside sources to fund ongoing operations and programming.

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HB1393

STEM is critical in K-12 education to help equip our students to what they need to be college ready in order to pair up with what our economy needs.

This legislation will continue the establishment of a ND state wide student-centric STEM network to support STEM Education in K-12 education. This legislation leverages this investment to obtain funding from business, industry, and other private sources to support the networks ongoing and expanding work.

The STEM network has been busy and here are the goals that they have set out to achieve in 2015-2016.

Create Industry-Education Exchanges to connect employers with educators.

2016 North Dakota STEM summit

STEM Economy Data for Decision Making

Continue Regional STEM Network Meetings

STEM Days for K-12 students

Fundraising and grant writing

I have included on your desks a summary of each.

The bill has a \$100,000 fiscal note in order to fund this program through the Dept. of Career and Tech Ed.

I ask this committee for a favorable recommendation

Thank you.

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**House Education Committee
Testimony on HB 1393**

**Department of Career and Technical Education
January 26, 2015**

Mr. Chairman and members of the Education Committee my name is Wayne Kutzer
Director of the Department of CTE. HB 1393 provides \$100,000 to help implement and support
STEM initiatives and activities.

Last session, CTE, through a Senate resolution, was asked to help STEM efforts in ND
and provide support and guidance. Attached is a list of STEM related activities that we have
helped to manage: Innovation Grant; STEM Innovation and Matching Grant; and, STEM
Infusion Grant. A new course in Biomedical Technology has been put together, as part of the
STEM Infusion Grant as well as classroom career development days like "You're Hired". This
biennium we have started to provide financial support for Project Lead the Way and
Engineering by Design courses in 37 schools across the state.

The funding in this bill will enable us to continue the statewide STEM conference for
teachers and administrators and new regional STEM Day activities for K-12 students. We will be
able to provide continued coordination to the STEM Network so they can continue their
regional activities as well as serve as a hub and clearing house of STEM information, helping to
connect and coordinate resources.

Mr. Chairman I support HB1393 and would be glad to answer any questions you might
have.

Grants for Innovation History

Dickinson Publ.	5	\$2,364	\$2,223					
Carl Ben Elelson Middle School		\$1,691	\$1,609	\$950	\$950	\$1,484	\$954	\$933
West Fargo Sheyenne Center		\$1,440	\$1,440			\$2,701	\$265	
Hillsboro High School		\$2,100	\$600					\$1,100
Simle Middle School		\$1,790	\$1,523					
Thompson Public School		\$2,000	\$1,975					
Wachter Middle School		\$2,000	\$2,000			\$2,000	\$1,817	
Ashley Public School		\$2,000	\$2,000					
Bismarck Career Academy		\$2,500	\$2,500	2,489	2,489	\$1,183	\$1,137	
		\$60,500	\$53,297					
Northstar Public School				\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
Northstar Public School				\$2,000	\$1,822			\$2,000
West Fargo High School				\$3,003	\$3,003	\$3,500	\$3,500	\$3,500
Larimore Public School				\$1,685	\$1,685			
Grimsrud Elementary School				\$2,000	\$2,000	\$1,963	\$1,019	
Washburn Elementary School				\$1,715	\$1,715			
Highland Acres Elementary School				\$1,999	\$1,999			\$1,843
				\$64,502	\$51,724			
Dickinson State University						\$6,573	\$4,129	\$7,400
Barnes County North						\$2,500	\$2,500	\$2,500
NESC/ILT						\$2,000	\$2,000	
						\$56,236	\$48,878	
Fargo Discovery Middle School								\$3,500
Northern Cass Public School								\$3,500
Hazen Elementary School								\$1,999
Mandan High School								\$1,971
Youth Correctional Center								\$2,000
								\$59,217

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STEM jobs tend to be high-paying. Median hourly pay for all STEM jobs in North Dakota in 2014 is \$27.90. Engineers are the highest-paying of the eight categories at \$35.11, followed by physical scientists and mathematicians. The technician-level occupation groups also offer good pay, with median pay for engineering technicians at \$22.38 and life and physical science technicians at \$19.04. However, there remains room for STEM job pay in North Dakota to increase. The following table compares pay in the state to a baseline average of nine surrounding states. Pay for technicians in North Dakota is generally competitive, particularly life science technicians and entry level engineering techs. However pay lags in many other categories, marked most acutely by computer jobs where 10th percentile workers make 82% of the regional average and those in the 90th percentile just 74% of workers across the region.

ND Pay vs. 9 Upper Plains States, 2014

Description	Pct. 10 Hourly Earnings	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings	Pct. 90 Hourly Earnings
Computer Occupations	82%	80%	77%	76%	74%
Mathematical Science Occupations	85%	83%	78%	76%	83%
Engineers	88%	89%	88%	88%	89%
Drafters, Engineering Technicians, & Mapping Technicians	99%	94%	91%	91%	90%
Life Scientists	90%	90%	95%	92%	89%
Physical Scientists	105%	93%	86%	81%	76%
Social Scientists & Related Workers	88%	82%	87%	91%	90%
Life, Physical, & Social Science Technicians	98%	96%	98%	102%	100%
Total	87%	84%	82%	82%	80%

Attachment #4

HB 1393

1/26/15

Testimony in SUPPORT- HB 1393
Matthew Leiphon- North Dakota STEM Network

January 26, 2015

Chairman Nathe, members of the committee,

My name is Matthew Leiphon, and I work with the management team of the North Dakota STEM Network. I am here today to testify in SUPPORT of passage of House Bill 1393. The funding provided by this bill will enable North Dakota's STEM stakeholders, from business, economic development and education, to continue to work to find new and innovative ways to prepare our state's students for careers in growing, science, technology, math, and science (STEM)-related industries.

The ND STEM Network works to connect and increase cooperation throughout the state in order to provide opportunities for students to be creative, innovative, and prepared for careers in STEM. The Network's leadership is committed to ensuring STEM education is responsive to real-world opportunities and needs, engaging business as a key partner. By ensuring industry has a seat at the table, the STEM Network provides educators with valuable guidance and access to resources from the private sector, helping our teachers better prepare students for STEM-related jobs with North Dakota companies.

North Dakota's rapidly growing and changing economy is causing increased demand for a STEM-ready workforce, with new and expanding industries creating job openings requiring strong STEM-skillsets. According to analysis conducted by the Network, North Dakota led the nation in growth of STEM jobs between 2004 and 2014, adding 37% to its STEM workforce of engineers, technicians, and scientists. Despite this growth, North Dakota remains towards the bottom for

concentration of such jobs. STEM jobs represented just 3.3% of all jobs in North Dakota in 2014, ranking just 44th among all the states. As North Dakota's economy grows, diversifies, and new industries emerge, it's projected that the state will need to fill 8000 new, highly-skilled STEM jobs by 2022. There is strong demand, but the state still trails others in STEM jobs. This shows the strong need to invest in initiatives to strengthen the state's STEM education system and to build ties to industry.

Providing North Dakota's young people with access to top-quality STEM education opens the door to great careers. STEM jobs tend to be high-paying. According to analysis conducted by the Network, the median hourly pay for all STEM jobs in North Dakota in 2014 was nearly \$28 per hour. That's nearly \$10 per hour more than the overall median pay of \$18.50. Professions requiring four year and advanced degrees, such as engineers and physical scientists, are some of the highest paid positions, but technician-level occupation groups also offer great pay, opening opportunities for students who choose other educational paths.

Making sure our students are well-prepared for these cutting-edge careers will require coordination of efforts between our state's educators and business leaders. The best way to meet our workforce needs and create economic opportunity for our citizens is to develop a pipeline of talent from within. By working together, the state can "punch above its weight" in building a strong, career-ready workforce. Building partnerships will take resources, however, which is why funds provided by House Bill 1393 are so important.

Today, teachers, educators, and STEM practitioners are active in pockets throughout the state, rolling out innovative programming designed to prepare students for the STEM economy. With so many different activities and entities operating independently around the

state, there is a degree of fragmentation of efforts. The STEM Network's goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that connect and coordinate private and public sector STEM projects.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a focus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network is in the process of building a foundation for something that has taken years and decades to build up in other states. The efforts to add structure to the network over the past year are supporting teachers in their ongoing delivery of STEM education, strengthening existing connections between business and educators.

Building these connections can't be the responsibility of the state alone. Creating a strong network will require investment and commitment from the private and public sectors. Over the past year, we've met and worked with multiple businesses throughout the state. We've also hosted regional meetings bringing together educators, policymakers, economic developers, and business leaders to discuss ways to work together. Companies including Bobcat, Northrop Grumman, and Microsoft have kindly hosted or participated in these events, providing an opportunity for collaboration and engagement.

In addition to hosting regional events, the Network has been involved in several other activities to build STEM business-to-education partnerships:

- Hosting a statewide conference with the support of industry and other sponsors attended by close to 150 educators, business leaders, economic developers, and industry representatives;

- Performing one-on-one outreach meetings with employers to gather information and advocate for industry support of STEM initiatives and advancement of STEM workforce development, and;
- Producing economic, workforce, and data analysis reports by industry and occupation to provide stakeholders and policymakers with valuable information on STEM workforce needs and trends.

Over the next two years, the STEM Network will continue to build on these efforts to build industry-education exchanges, working with business to host meetings, gather input, build connections with educators, and create new partnership opportunities.

The Network plans to continue to actively pursue outside resources to supplement the state's investment. The Network has founded a nonprofit organization, and is in the process of seeking federal 501c3 status in order to better position the initiative to pursue outside resources. Our goal is to use industry support as a model for long-term sustainability, supported by grant funding, donations, and other private sources of support and funding.

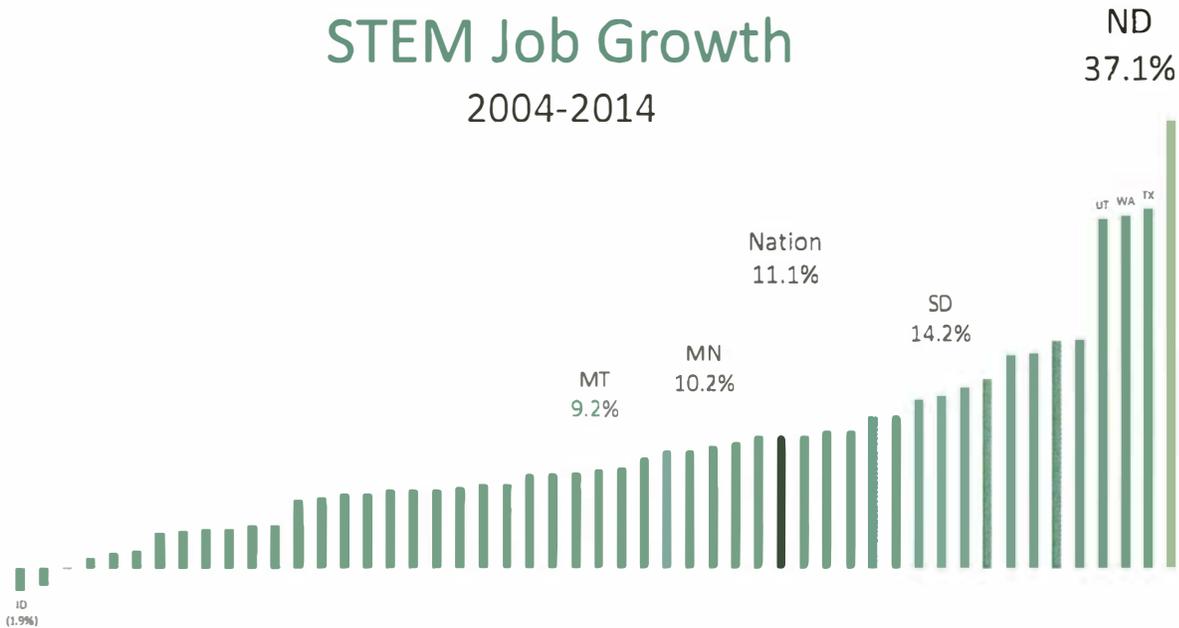
By passing HB 1393, North Dakota will be investing in stronger industry-education ties, highlighting the work of innovative STEM educators, and pursuing expanded industry and grant funding and support. The Network is a connection between the state's already active education and economic development activities. By working together, this public-private partnership can build a foundation for strong careers for our state's citizens and a strong economic future for our state.

The State of STEM in North Dakota

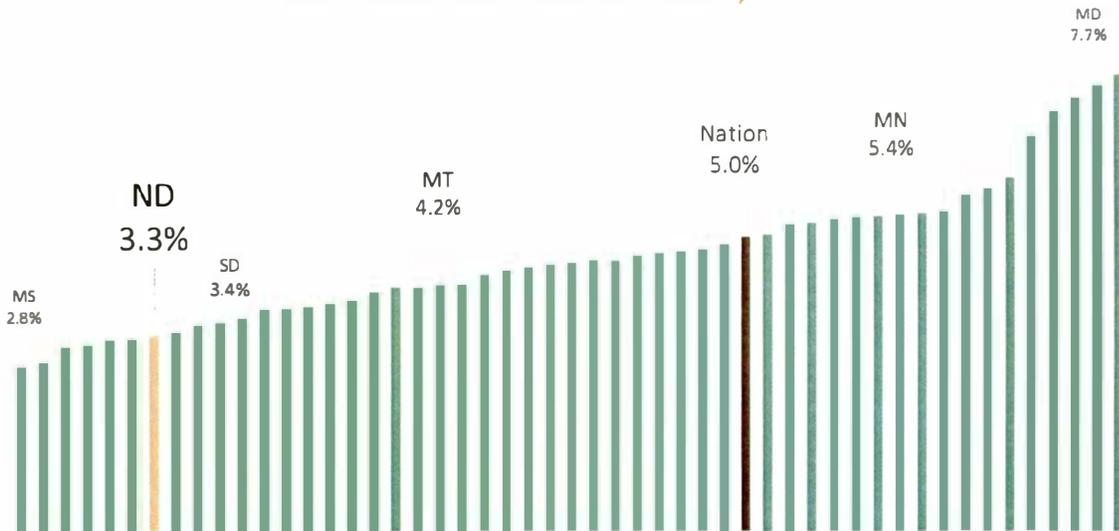
January 26, 2015

North Dakota led the nation in growth of STEM jobs between 2004 and 2014 adding 37.1% to its STEM workforce of engineers, technicians, and scientists. Yet STEM jobs represent just 3.3% of all jobs in North Dakota, ranking 44th among all states. Despite this growth, North Dakota remains towards the bottom for concentration of STEM jobs. It is estimated that the state will need to fill 15,000 highly-skilled STEM jobs by 2018.

STEM Job Growth 2004-2014



STEM Job Concentration, 2014



The state's largest STEM job category is computer-related occupations, totaling 6,800 jobs. There are nearly 4,000 engineers in the state and another 2,500 works in technician-level engineering jobs typically requiring 2-years of training. Largely driven by the expanding energy economy over the past five years, engineers, engineering technicians, and physical scientist are the fastest growing STEM job categories, each over 40% since 2009. Overall, STEM jobs are up 19% since 2009.

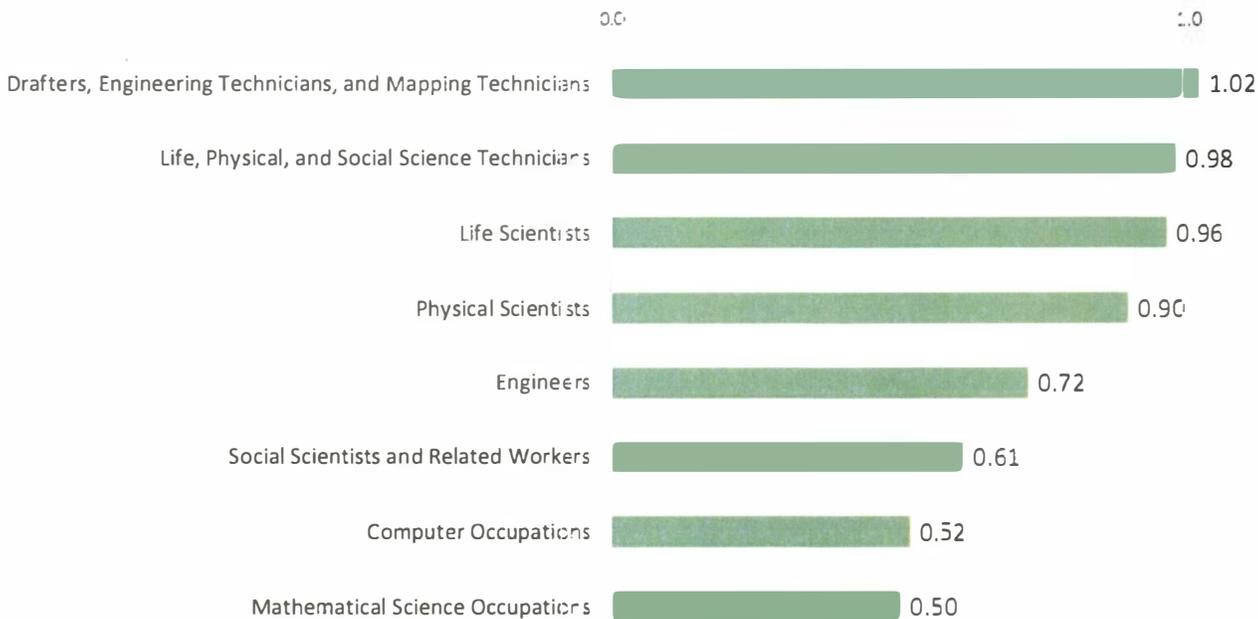
ND STEM Jobs

Description	2014 Jobs	2009 - 2014 % Change
Computer Occupations	6,788	6%
Engineers	3,989	41%
Drafters, Engineering Technicians, and Mapping Technicians	2,452	46%
Life, Physical, and Social Science Technicians	1,184	23%
Life Scientists	959	2%
Physical Scientists	889	46%
Social Scientists and Related Workers	630	(3%)
Mathematical Science Occupations	227	4%
Total	17,117	19%

Even after the recent growth, just one of the eight major STEM job categories holds an above-average concentration in the state in 2014: life and physical science technicians. The following chart shows the ratio of the local share of total jobs in each STEM category in North Dakota divided by the national share of jobs in the same category. The ratio for science technicians is 1.02, indicating that the concentration in North Dakota is just 2% above average. National average concentration is 1.0.

The state lags the national average in all other occupation categories, but most acutely in social scientists, computer occupations (even though this is the largest of the eight groups) and mathematics jobs. The state is rapidly adding engineering jobs, yet it remains 28% below national average in concentration of engineers.

ND STEM Occupation Concentration, 2014



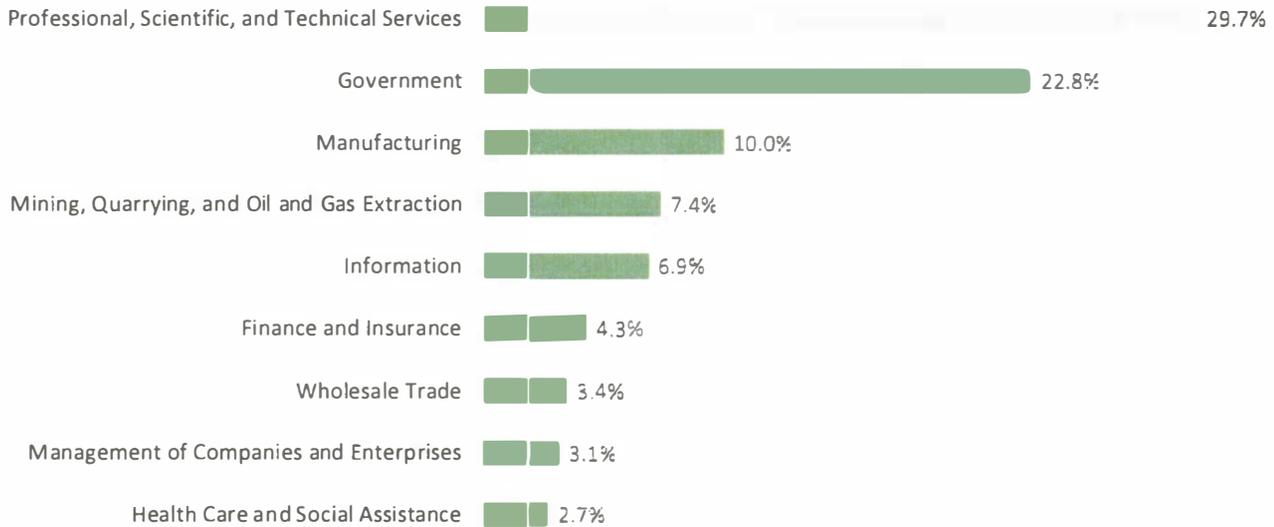
More than a quarter of all STEM workers in North Dakota are employed by professional, scientific, and technical services firms. These include high-end business-to-business services sectors such as engineering services and consulting. Another

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22% of STEM workers are employed by local, state, and federal government agencies. Manufacturers account for another 11% and the mining and extraction sector another 9%.

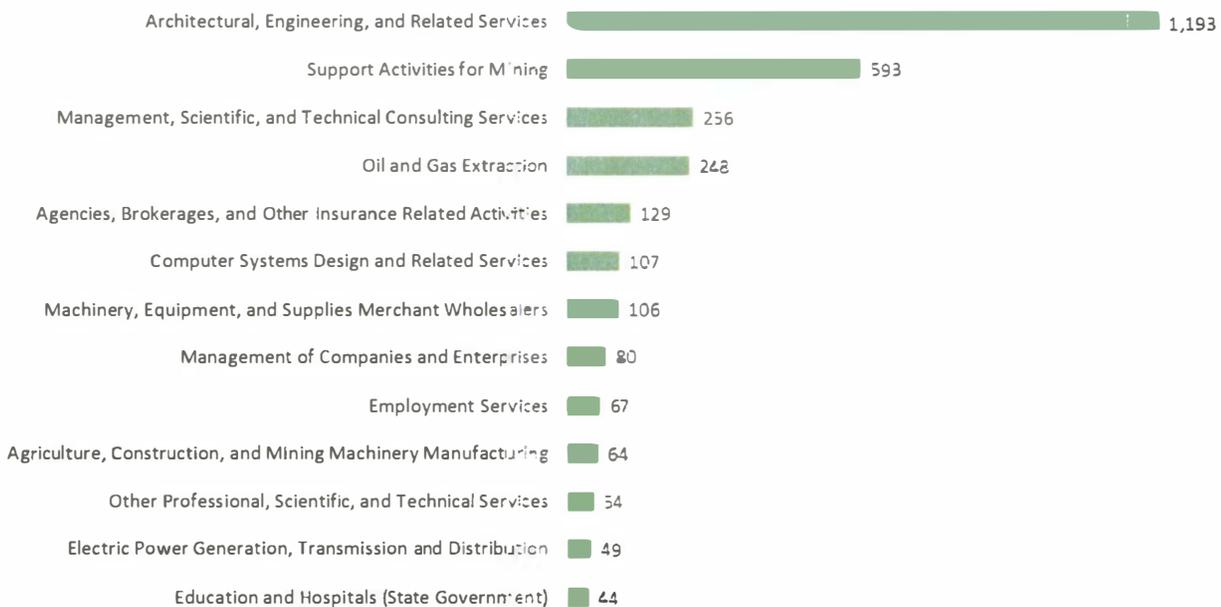
Where are the STEM jobs?

ND STEM Jobs by Industry, 2014



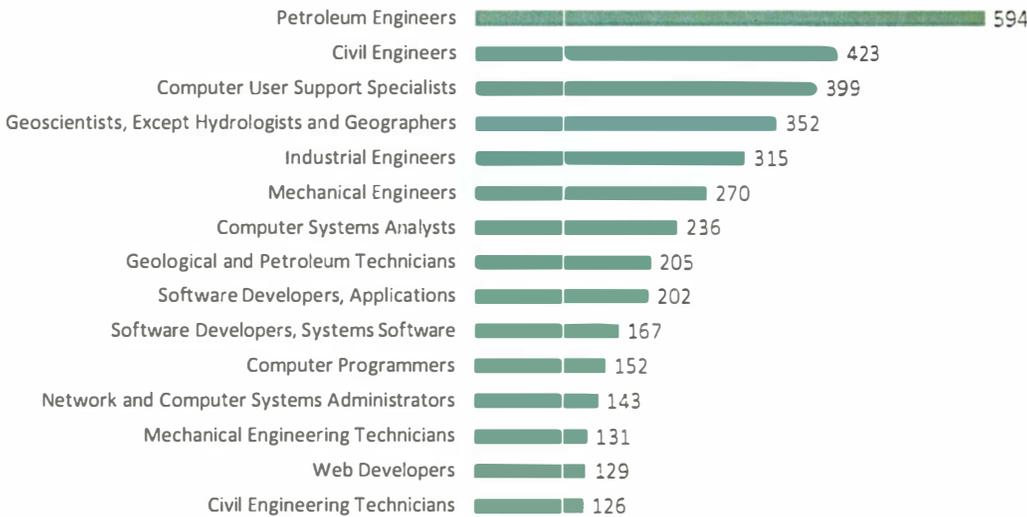
Drilling down in to particular industries and the number of new STEM jobs in each, architecture and engineering services firms led the way with nearly 1,200 new jobs in the past five years. The support activities for mining added another 600 and extraction another 250 STEM jobs.

STEM Growth Industries, 2009-2014



Job growth is one major driver for labor force demand, but retirements and general job churn also are a source of job openings. The following chart lists overall openings for STEM occupations since 2010 and projected to 2015. The effect of the energy boom is apparent with the need for nearly 600 new petroleum engineers and many more civil engineers, geoscientists, industrial, and mechanical engineers. Other active occupations include computer and information technology-related jobs, a good sign as this sector is currently underdeveloped in North Dakota.

STEM Openings, 2010-2015



Adjusting degree production for the size of the state, North Dakota is one of the nation's most significant talent producers. The following table lists the state's degree production for the state's largest STEM-related degree programs over the past decade. The right-hand column charts a trend line of degrees awarded for each program since 2003. The state is seeing rising production across many degree categories.

ND STEM Degree Production

Program	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Trend Line
Mechanical Engineering	136	154	140	153	146	139	137	136	148	136	196	
Electrical Engineering Technologies/Technicians	90	124	111	146	168	125	161	212	136	143	167	
Biology, General	129	119	122	145	150	163	136	141	178	161	159	
Clinical/Medical Laboratory Science/Research and Allied Professions	53	41	51	88	128	116	138	150	168	150	157	
Industrial Production Technologies/Technicians	119	131	135	135	114	134	170	212	213	163	140	
Civil Engineering	122	149	85	116	85	113	98	107	127	122	125	
Electrical, Electronics and Communications Engineering	95	83	110	102	98	106	108	104	97	114	116	
Management Information Systems and Services	135	157	119	82	75	73	81	90	156	106	107	
Zoology/Animal Biology	52	60	67	76	83	74	71	50	74	88	94	
Computer Science	9	65	74	64	49	66	64	77	75	92	84	
Computer and Information Sciences, General	229	159	129	116	86	86	89	110	84	71	69	
Mathematics	51	43	47	48	45	49	56	59	49	61	54	
Chemistry	53	52	51	29	55	53	50	39	54	61	50	
Microbiological Sciences and Immunology	23	18	36	29	20	19	25	27	32	38	49	
Computer Engineering	2	6	7	14	15	18	23	32	14	21	44	
Industrial Engineering	28	22	27	22	25	21	23	32	35	46	40	
Chemical Engineering	11	23	22	37	22	24	22	36	32	23	31	

STEM Infusion Initiative (STEMii) Report Update

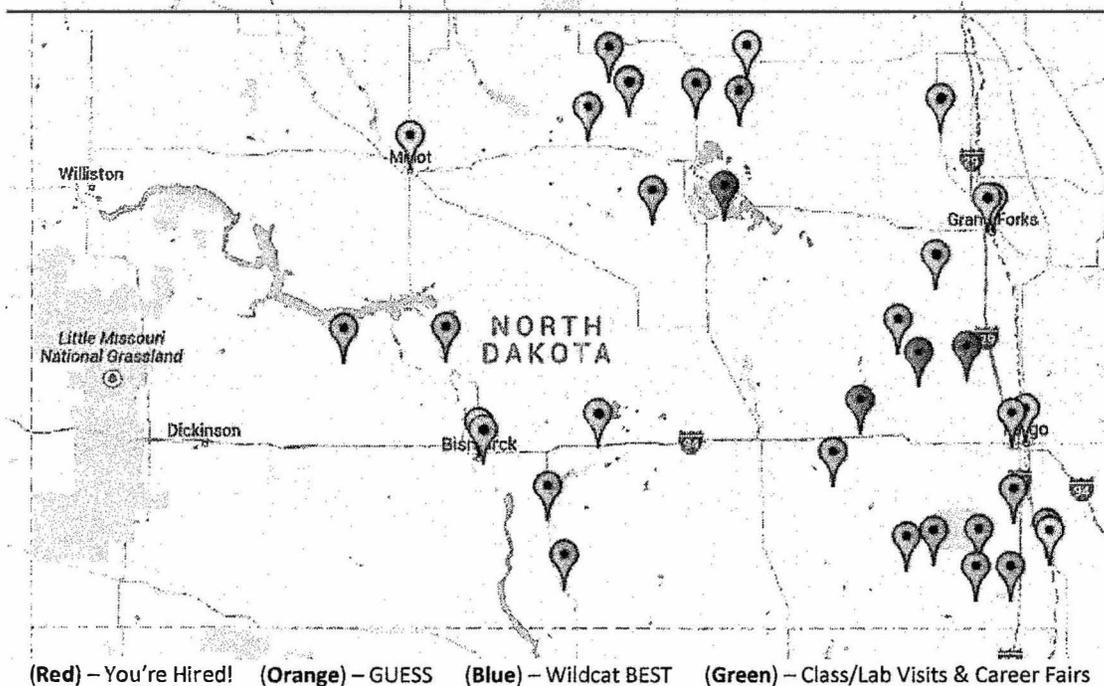
August 1, 2013 – December 31, 2014

Project Goals:

STEMii will create a transformative educational experience and provide the path for students to become gainfully employed in STEM-based workforce. Building on the success of current NDSCS outreach activities, NDSCS will enhance identified STEM-based programs to increase enrollment and retention of students by engaging them through active learning. These efforts will then focus on two sets of activities: (1) recruitment and engagement and (2) retention and successful 2-yr college graduation.

Accomplishments to Date:

Deliverables 1 and 2 – number of students served and schools receiving services to date
 NDSCS STEM Outreach reaches across North Dakota!



2013 – 2014 School Year

Name of school	New school for 2013-2014	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Beulah MS		111			
Bismarck HS			10		
Central HS, Grand Forks	X				110
Cheney MS, West Fargo		363			

North Dakota State College of Science
 STEM Infusion Initiative (STEMii)
 8/1/2013 – 8/1/2015
 Contact: Dr. Kristi Jean

Name of school	New school for 2013-2014	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Fargo North & South HS					28
Four Winds Community HS				18	
Grafton HS			11		
Grand Forks 8 th & 9 th graders			25		
Hankinson HS		123			
Hatton	X		9		
Hazelton-Moffit-Braddock HS	X	19			
Health, Tech & Trades Career Fair, Fargo					300
Hope-Page HS	X	71		16	
Liberty MS, West Fargo	X	124			
Lidgerwood HS		68			
Litchville-Marion HS	X	52			
Maddock Public School	X	76			
Milnor HS	X	81			
Minot HS					94
Munich HS	X				30
North Sargent HS	X	93			
Northern Cass HS				17	
North Star, Cando		9			
North Valley Career Fair, GF					200
Red River HS, Grand Forks	X				75
Richland 44 HS	X	131			
Rolette HS		9			
Rugby HS		9			
Schroeder MS, Grand Forks	X				20
Sheyenne HS, West Fargo		23			
Simle MS, Bismarck			16		
South MS, Grand Forks	X				20
Starkweather HS		9			
Steele HS	X		11		
Strasburg HS	X	70			
Valley City HS				21	
Wahpeton HS					8
Wahpeton MS		191		12	
Washburn HS	X	111			
Wolford HS		9	3		
Wyndmere HS		83			
Total Schools Served = 40 (excluding career fairs)	17	1,826	85	84	652

*description of activities follows

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2014 – 2015 School Year (as of December 2014)

Name of school	New school for 2014-2015 (fall)	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Beulah MS		115			
Cheney MS, West Fargo		308			
Girl Scout STEM Event					28
Grand Forks 8 th & 9 th graders			18		
Liberty MS, West Fargo		92			
Lidgerwood HS		80			
Lisbon HS	X				51
LRSC Occupational Fair, Devils Lake	X				500
Maddock Public School		72			
MCC, Minot	X				82
Milnor HS		75			
North Sargent HS		99			
Northern Cass HS					14
Sheyenne HS, West Fargo		69			
Simle MS, Bismarck			20		
Wahpeton HS					200
Wahpeton MS		73			
Wyndmere HS		95			
Total Schools Served = 15 (excluding career fairs)	3	1,078	38		875

**description of activities follows*

Note: Student contacts for 'You're Hired!' program can include repeating students from the 2013-2014 school year as some schools have multiple grades participating. GUESS numbers are new student contacts.

STEMii Impact To-Date

Year	Total Schools Served (excluding career fairs)	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
2013-2014	40	1,826	85	84	652
2014-2015	15	1,078	38		875
Total (as of December 2014)	55	2,904	123	84	1,527

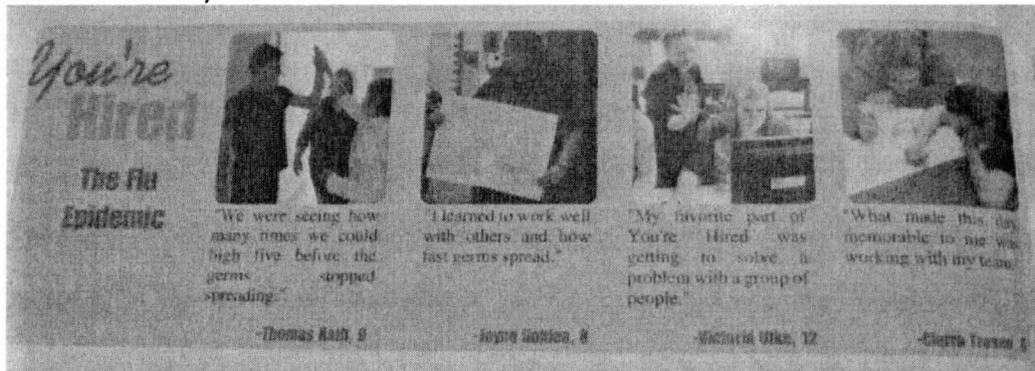
You're Hired! Project Update:

'You're Hired!' (YH) is a coherent series of STEM-focused, day-long activities that require students to work as a 'company' for an entire school day to find a solution to a relevant, present-day problem and then communicate their discovery to a community-led boardroom, comprised of school administrators, school board members and local industry representatives. Examples of present-day problems include using a nano-coated sand to clean up oil spills, calculating reaction times to determine first-hand the dangers of texting while

driving, and building a nightlight circuit on an electronics breadboard to test and calculate the amount of energy that can be saved by switching from incandescent to LED light bulbs. YH is experiencing wide acceptance within our secondary schools as educators see this project as a method to provide a STEM experience and assess 21st Century Skills without overburdening their existing resources. A total of 2,904 students from the 32 schools listed have conducted 1 to 3 STEM days since August 1st 2013. All of the schools participating to date for the 2014-2015 school year are returning schools.

The project is generating positive comments from a variety of sources.

- 'I like STEM day. It is challenging, yet fun. It stresses me out, but in a good way.' – *Wyndmere student.*
- At the end of this report, we are also including newspaper articles from Hankinson, Wahpeton, Hope-Page and Strasburg HMB. You're Hired even made the Hankinson yearbook:



- 'I'm also excited to see our STEM project days are spilling over into the rest of the district. The 4th grade is having a STEM day based on the 3 Little Pigs and the students have to design a house from the same choices the pigs had and see how it stands up to a wind source.' *Patty Mosset, Beulah MS teacher 10/01/2014*
- 'My 5th graders are already excited for the Math Olympics and it's only December! All of you involved did an outstanding job. My students really enjoy Mathematics and the Math Olympics are a big reason why. Thank you!' *Matt Pfeifer, Sargent Central Teacher*
- 'I say we pilot it and see what happens.' – In regards to piloting a 'Skype' boardroom. NDSCS physics students as used Skype to watch YH presentations and deliver immediate feedback to the students. *Scott Strenge, Wyndmere HS*

Schools have been inviting neighboring schools to the boardroom, which resulted in new schools signing up late in the spring semester, such as North Sargent, Litchville-Marion and Milnor. 'I had a teacher at the Hankinson STEM day and she was very impressed with the opportunities it gives students. She described it as "everything we try to teach kids." I'm very interested. What information can you get me to get it off the ground here in Milnor?' *Chris Larson, Milnor HS Principal 3/11/2014* Shortly after Milnor conducted their first STEM day, we received the

following: 'The response has been great here. When can I get on the schedule for next year?'
(4/22/2014)

On 11/06/2014 a new boardroom approach was piloted at Wyndmere High School in Wyndmere, ND. Instead of having community members physically go to the school to judge presentations and provide immediate feedback to the students, Skype was used to accomplish the same task in a virtual setting. Students had to think outside of the box to make sure that they were presenting their solutions and ideas in a format that would work with their new audience. The boardroom consisted of NDSCS physics students that were located in Wahpeton, ND. These NDSCS boardroom judges had the opportunity to listen to the student presentations, ask questions based on the presentation, and provide immediate feedback to the companies. With the success of this new boardroom approach future boardrooms could include professionals from not only the immediate surrounding area, but from across the state and beyond.

GUESS Project Update:

The GUESS Project's mission is to promote girls' interest in STEM careers. Girls spend a 'day at the lab' doing hands-on experiments focused around the emerging technology areas of Nanoscience, Biotechnology, Microelectronics and Engineering. Once the girls have completed the GUESS What project, they can participate in GUESS Again, which uses the same 'day at the lab' model, but has a welding focus. This project has been shown to be statistically significant in increasing interest in STEM as well as shown girls enrolling in welding.

Both GUESS and GUESS Again use the same model in reaching 8th and 9th grade girls. The daylong event is run by women professionals and includes hands-on experiments for schools across North Dakota. In the 2013-2014 school year, 85 students and 10 teachers have been impacted by GUESS (Girls Understanding and Exploring STEM Stuff).

Two GUESS events took place the fall of 2014 that impacted 38 students and 4 teachers. Also in the fall of 2014 work was done to develop GUESS events that will be located on the NDSCS main campus in Wahpeton, ND. The main campus GUESS events will include sessions focused around Robotics and Mechatronics, Precision Machining, Welding Technologies, as well as Microbiology, Microelectronics, Engineering and more. The new GUESS events will have greater access to influential college students to act as assistants and instructors as well as a broader diversity in the session topics. Participants will have a chance to create multiple keepsakes from the day which have been a huge highlight mentioned from returning teachers. Work has also been done in the fall of 2014 to focus less on a specific age of students (8th and 9th grade girls), and instead focus on working with the technology teachers from the various schools to connect with the girls that are going to be eligible to take the CTE courses offered in the next semester.

Wildcat BEST Robotics Update:

The BEST (Boosting Engineering Science and Technology) Robotics mission is to inspire students to pursue careers in engineering, science, technology, and math through participation in a sports-like science- and engineering-based robotics competition. This competition lasts for approximately six weeks with a kick off day in September, a mall day (to practice) in October

held one week prior to the competition, and the competition day at the end of October modeled after a sporting event.

For the 2013 season, we started the season with 10 teams participating and over 150 students and teachers. By game day (Nov 1, 2013), we had 6 schools participate with 120 students. The game day participating schools (including two Minnesota schools): Hope/Page, St. Josephs (MN), Valley City, Breckenridge (MN), Ft. Totten, Northern Cass. For the 2014 season, NDSCS provided referee and judging support for the NDSU Bison BEST competition. Wildcat BEST Robotics did not have a 2014 season.

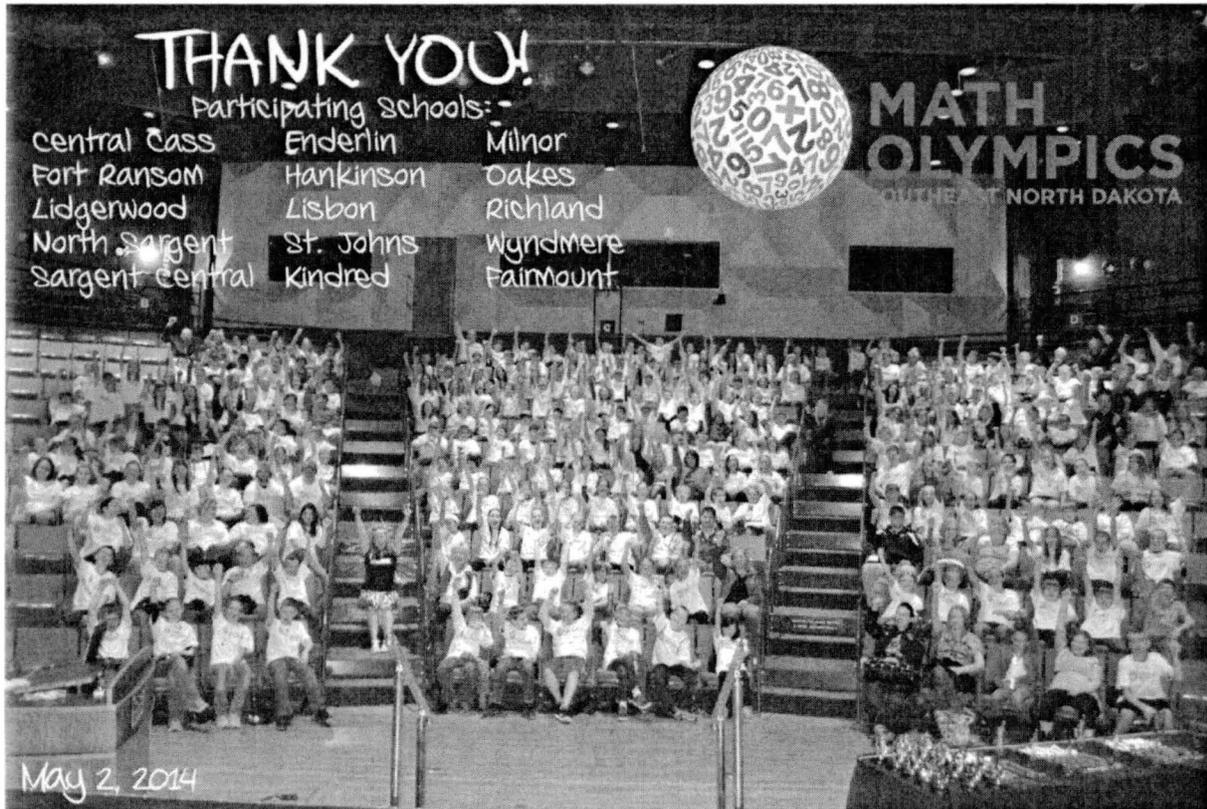
Classroom and/or Lab Visits:

The Center for Nanoscience Technology Training hosts tours for secondary schools on a request basis. Students enjoy doing hands-on activities in any of the four areas: nanoscience, microelectronics, biotechnology and engineering. The day is tailored to the needs of the teacher/class. School classroom visits are also conducted as resources permit, with the activities once again tailored to the needs of that classroom.

- Sept 26, 2013: Fargo North/South health careers class (28 10th-12th graders, biotechnology)
- Oct 24, 2013: Minot (94 11th-12th graders, microelectronics)
- Nov 7, 2013: Munich (30 7th-12th graders, nanoscience)
- Nov 13, 2013: North Valley Career Fair Grand Forks (200 10th graders, nanoscience and microelectronics)
- Dec 12, 2013: Health, Tech & Trades Career Expo Fargo (300 9th graders, nanoscience and microelectronics)
- Feb 18, 2014: West Fargo Insourced Professional Development (324 MS and HS teachers, 2-yr career options presentation)
- Feb 18, 2014: West Fargo Insourced tour (20 teachers, nanoscience)
- Feb 19, 2014: Wahpeton High School (8 11th-12th graders, nanoscience and microelectronics)
- Mar 19, 2014: South Middle School, Grand Forks (20 8th graders, nanoscience)
- Mar 19, 2014: Red River High School, Grand Forks (75 10th-12th graders, biomedical technology)
- Mar 24, 2014: Technical Student Association (TSA) Conference, Bismarck (100 students from multiple ND schools, biomedical presentation)
- Mar 26, 2014: Schroeder Middle School, Grand Forks (20 8th graders, nanoscience)
- Mar 26, 2014: Central High School, Grand Forks (110 10th-12th graders, biomedical technology)
- Apr 24, 2014: ACTE Conference (20 HS teachers, You're Hired presentation)
- May 2, 2014: Southeast Math Olympics (220 4th-6th graders from 15 elementary schools)
- May 19, 2014: Marketplace for Kids (100 4th – 6th graders from 8 elementary schools, microcontrollers)
- June 9, 2014: Career Awareness Seminar (40 HS teachers and counselors, STEM)
- June 11, 2014: EDC Professional Development (12 HS teachers, nanoscience)
- Aug 6, 2014: National Agriculture Genotyping Site Visit and Tour (NDSCS-Fargo)
- Sept 10, 2014: LRSC Occupational Fair (500 students from Devils Lake area schools)
- Oct 22, 2014: Manufacturing Day – STEM (200 juniors and seniors from Wahpeton HS on NDSCS Main Campus)
- Nov 15, 2014: STEM Girl Scouts Event (28 girls at NDSCS Main Campus)

North Dakota State College of Science
STEM Infusion Initiative (STEMii)
8/1/2013 – 8/1/2015
Contact: Dr. Kristi Jean

Nov 21, 2014: Microelectronics with Physics Students (82 Minot HS students)
Nov 25, 2014: A&P Lab Tour (80 1st and 2nd year NDSCS biology students at NDSCS-Fargo to learn about variety of STEM programs)
Dec 4, 2014: Fargodome Career Fair



Deliverable 3 – business and industry partnerships assisting in STEMii (funding, speakers, tours, internships, job shadows, etc.)

- \$9,500 total donation from AT&T to support the GUESS project
- Meetings with Elinor Coatings, Aldevron, Vicon Coatings, Cass County Electric Cooperative, United Way Cass-Clay, and Hidden Value Consulting to discuss funding and partnerships
- ComDel Innovations, Red River Valley Railroad, and Giant Seeds donating to support SE Math Olympics
- Partnering with Denise Jonas, CTE Director – Cass County Career & Technical Education Consortium on a non-traditional grant to provide a ‘Girls in Aviation’ themed GUESS activity that will be held January 30, 2015 at NDSCS-Fargo Campus.
- Presenting STEMii work at CTE Memorial Hall on January 28th, 2015. A teacher from Beulah MS will be bringing the winning teams from their first YH activity to participate in the STEMii exhibit. Students will have the opportunity to spend the day in Bismarck and conduct fun hands-on experiments in Memorial Hall.

Deliverable 4 – students enrolling in targeted CTE programs

The first year of the STEMii project will result in students enrolling in targeted CTE programs during the 2014-2015 school year. Data from the students enrolling in targeted CTE programs will be provided with the next report, based upon actual fall enrollment numbers.

CTE Dual-Credit Enrollment:

- Grand Forks Career and Tech Center

Grand Forks Career and Tech Center will launch Spring 2015 a pilot, dual-credit Biomedical Technology course. A specific focus from the Grand Forks GUESS girls' event in January was targeted enrollment for females into the Biomedical Technology class. These girls experienced hands-on activities that directly aligned with the course content they can expect to see in the Biomedical Technology course, with the future instructor of the course being a very visible active mentor in the GUESS day. This increased the interest and confidence the girls need to feel like they can be successful in this course.

NDSCS Engagement:

- NDSCS Faculty STEM Cohort

In order to increase student engagement and hands-on STEM activities, we will be assembling a cohort of NDSCS faculty (early adopters) who will be working directly with the STEM Outreach Specialist to bring more hands-on engaging female friendly projects into their classrooms and/or outreach activities.

Additional Information

STEMii funding support is used only for personnel expenses. All operating, equipment and travel are covered by non-STEMii funding.

Kristin Brevik has been hired to fill the NDSCS STEM Outreach Specialist position. Her start date was September 2, 2014.

#5

HB 1393

1/26/15

15.0878.01000

Sixty-fourth Legislative Assembly of North Dakota

Introduced by

Representatives Meier, Delmore, Dosch, Hawken, Hunskor, Monson, Schatz, Schreiber
Beck Senators Heckaman, Poolman, Schaible

1. 1 A BILL for an Act to provide an appropriation for a science, technology, engineering, and
2. 2 mathematics advancement initiative.
3. 3 **BE IT ENACTED BY THE LEGISLATIVE ASSEMBLY OF NORTH DAKOTA:**
4. 4 **SECTION 1. APPROPRIATION.** There is appropriated out of any moneys in the general
5. 5 fund in the state treasury, not otherwise appropriated, the sum of \$100,000, or so much of the
6. 6 sum as may be necessary, to the department of career and technical education for the purpose
7. 7 of providing a science, technology, engineering, and mathematics advancement initiative, for
8. 8 the biennium beginning July 1, 2015, and ending June 30, 2017.

(DRAFT of testimony, below)

Chairman Nath, Vice Chairman Schatz and members of the Committee:

I am Dr. Robert W. Pawloski, STEM Field Coordinator at University of North Dakota. Housed in College of Education and Human Development, my position also receives support from the Deans of Engineering and Arts & Sciences, as well as the Office of the Provost.

My background includes 20 years teaching 7th & 8th grade math and educational technology and 20 years implementing and evaluating numerous trans-disciplinary, multi-disciplinary and STEM outreach projects various at institutions of higher education.

My role at UND is to identify current STEM efforts and coordinate a needs assessment that can help to further strengthen our STEM education efforts. We are also studying other institutions of higher education approach STEM education, using a template for self-study provided by Project Kaleidoscope and the Keck Foundation. UNOmaha has shared with us their completed strategic plan, and we have held additional conversations with The University of Colorado at Boulder and Virginia Tech as well as with Dr. Paul Kelter, head of NDSU's STEM PhD Program.

Last October the ND STEM Network held their North East Regional meeting held on UND campus. My impression was that attendees – who included industry representatives, academic scientists, informal educators and some K12 formal educators - came away with a plethora of exciting NEW information about STEM outreach programs. There also appeared to be enthusiasm for the ND STEM Network's idea of an Industry Education Exchange. Several agreed that a central repository indexing such information would be very helpful in connecting programs with educators and student participants across the entire state of North Dakota. Community collaboration for the public good is characteristic of this effort, with funders increasingly placing value on partnerships to strengthen proposals. Universities that participate in such partnerships often find that, when they do, increased buy-in and trust, access to more and better ideas, and better opportunities result.

Based on my background, experiences and recent informal research, it is my opinion that the ND STEM Network has demonstrated an excellent start in building a strong collaborative effort across sectors, institutions, disciplines and the regions of North Dakota. However, everyone understands how difficult scheduling and attending such meetings can be. Important resources and new information has emerged from these meetings, and while archival documentation is certainly valuable, it is often limited in its reach. Initiating and sustaining strategic relationships among busy partners requires asynchronous networking. An online registry that provides easy access and searchability can facilitate partnerships and opportunity dissemination.

Obviously such a network requires resources in technical infrastructure and expertise and in developing and sustaining the system. I believe the proposed budget includes the appropriate allotment necessary for this. In addition, based on my experience with the Lewis and Clark Bicentennial and other such projects – I see a need for face-to-face ambassadorship and personal advocacy that establishes trust for initial recruitment, and the personal communication that is often key to building and sustaining a critical mass of participants as well as fresh and usable content. I wish to suggest one more final key to success. That will be to establish formative evaluation throughout development and implementation that informs and enables project management to make adjustments in the system towards continuous improvement and successful outcomes.

My informal research has found that Nevada is one example of a state that is considering the use of an Industry Education Exchange as part of a statewide STEM initiative (For further information see: <http://www.brookings.edu/research/reports/2014/11/12-nevada-stem-economy>). It is my opinion based on informal observation that government, industry, higher education, and K12 education would be served well by more coordination and communication to enhance STEM education in North Dakota. An adequately funded ND STEM Network, enhanced with an online Industry Education Exchange, will greatly enhance STEM education and career development in North Dakota.

House Education Committee
Testimony on House Bill 1393
January 26, 2015

6
HB 1393
1/26/15

Mr. Chairman and members of the committee, my name is Paul Keidel, Vice Chairman of the ND STEM Network and STEM Coordinator of the Missouri River Education Cooperative. We are in support of HB 1393.

The ND STEM Network aims to link and increase cooperation among all North Dakota stakeholders to provide opportunities and encourage all students to be creative and innovative, gaining 21st century skills through increased engagement in project-based learning and problem solving, driven by the science, technology, engineering and math (STEM) disciplines. These skills will allow more North Dakotans to graduate, gain additional skills and become part of a productive and competitive workforce in North Dakota. We believe this approach to education needs to become our vision for North Dakota students and is the responsibility, not only of educational institutions at all levels, but is the responsibility of all North Dakota citizens, businesses and communities

Currently the ND STEM Network has divided into 4 Regions. (NW, SW, NE and SE) All regions have gathered champions in their local communities and have started the organization of STEM communities that are preparing to take on the duties the Network set out to do after the last ND legislative session. Regional meetings have been held at Microsoft, Bobcat/Doosan, Bismarck State College, NDSU, Minot State University, Bismarck Career Academy, Fargo Public Schools, Dakota College at Bottineau and the University of ND.

Our plan is to keep moving forward with the same goals presented to the legislature during the last session.

ND STEM Network Goals

- Increase the number of STEM graduates
- Develop more cooperation among stakeholders
- Create more students wanting to and having the ability to learn by STEM integration
- Increase high school graduation rates
- Increase the STEM workforce needed in North Dakota
- Invest in economic development so the newly trained workforce can stay in their communities
- Have North Dakota rank first in K-20 education
- Help communities with Education Planning and Visioning to develop the demand for STEM education
- The diversity inherent to North Dakota is embraced and STEM is truly for all
- Expand the 21st century skill sets of North Dakota's Citizens
- Make use of a revolutionary systems approach to STEM education
- Connect PK-12 to workforce and the larger STEM community
- STEM becomes the responsibility of all North Dakota citizens

Because of the Network new programs have been growing around the state. Examples include: The NDSU Teacher in Industry Program, the FIRST Tech Robotics Challenge and STEM Fairs. The ND STEM Network produced a position statement in favor of the adoption of the Next Generation of Science Standards and held a ND STEM Summit (Professional Development Conference) along with ND REAs, the Council on the Arts, ND Career and Technology Education and ND Math Science Partnerships.

Testimony of Laney Herauf
Greater North Dakota Chamber of Commerce
HB 1393
January 26, 2015

Mr. Chairman and members of the committee, my name is Laney Herauf; I am the Government and Regulatory Affairs Specialist for the Greater North Dakota Chamber. GNDC is working on behalf of our more than 1,100 members, to build the strongest business environment in North Dakota. GNDC also represents the National Association of Manufacturers and works closely with the U.S. Chamber of Commerce. As a group we stand in support of House Bill 1393.

The Greater North Dakota Chamber works tirelessly to aid and provide the most successful business climate in the country. One of the main issues we hear from our business members is that we need more workforce and a more skilled, technically trained workforce. This bill gets to the heart of that issue and requests funding to the department of career and technical education to provide a STEM advancement initiative. North Dakota leads the nation in STEM workforce growth, now is the time to continue to invest in growing our STEM workforce.

It is estimated that North Dakota will need to fill 15,000 highly skilled STEM jobs by 2018. This bill could help alleviate that need. The Greater North Dakota Chamber respectfully requests a DO PASS recommendation on House Bill 1393. Thank you and I would be happy to answer any questions.

#1

3/9/2015

Rep Lisa Meier

Dist. 32

HB 1393

Thank you Mr. Chairman and members of the Senate Education Committee

This bill allows us to continue the statewide STEM conference for teachers and administrators and new regional STEM Day activities for k-12 students. We will be able to provide continued support so they can continue their regional activities as well as serve as a hub and clearing house for STEM information, helping to connect and coordinate resources.

Because of the Network new programs have been alive and growing throughout the state.

This is a great program to help prepare and encourage our youth for the opportunities we have available in STEM careers in our state.

There are others here to testify in favor of the bill and I ask a favorable recommendation.

Thank you Mr. Chairman

111

#2
3/9/15

Testimony on HB 1393
Senate Education Committee
Department of Career and Technical Education
March 9, 2015

Mr. Chairman and members of the Education Committee my name is Wayne Kutzer Director of the Department of Career and Technical Education. We support HB 1393 which provides \$100,000 to help implement and support STEM initiatives and activities.

The funding in this bill will enable us to continue the statewide STEM efforts in cooperation with the ND STEM Network. It specifically will continue to partially fund two annual STEM conferences for teachers and administrators and four to five new regional STEM Day activities each year for K-12 students. Our agency will provide administration and coordination for the STEM Network so they can continue their regional activities as well as serve as a hub and clearinghouse of STEM information, helping to connect and coordinate resources across the state.

Last session, CTE, through a Senate resolution, was designated as the STEM agency in ND, to help direct and coordinate STEM efforts ...to provide support and guidance. Attached is a sample list of STEM related activities that we worked with in our agency: Innovation Grant; STEM Innovation and Matching Grant; and, STEM Infusion Grant. A new course in Biomedical Technology has been put together, as part of the STEM Infusion Grant as well as classroom career development days like "You're Hired". This biennium we have started to provide financial support for Project Lead the Way and Engineering by Design courses in 37 schools across the state

Mr. Chairman and members of the committee, I support HB1393 and would be glad to answer any questions you might have.

Grants for Innovation History

#20
3/9/15

Fiscal Agent

Fiscal Agent	FY 2008		FY 2009		FY 2010		FY 2011		FY 2012		FY 2013		FY 2014		FY 2015	
	Approved	Spent	Approved	Spent	Approved	Spent	Approved	Spent	Approved	Spent	Approved	Spent	Approved	Spent	Approved	Spent
Apple Creek School	\$590	\$590			\$880	\$747	\$423	\$423	\$1,690	\$310						
Beulah Middle School	\$1,500	\$1,500														
NDSU	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
Fort Totten	\$1,000	\$0	\$2,000	\$2,000	\$2,500	\$0			\$1,000	\$0	\$1,752	\$1,752	\$1,999	\$1,999	\$2,415	
Grafton High School	\$1,342	\$0							\$2,700	\$2,700	\$2,000	\$1,917				
Grafton Middle School	\$1,360	\$1,360	\$860	\$860	\$1,000	\$1,000	\$2,000	\$2,000								
Grand Forks Ben Franklin Elementary	\$1,100	\$0														
Grand Forks Central	\$1,980	\$1,980														
Grand Forks Red River	\$1,980	\$1,980														
UND	\$10,000	\$9,773	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$6,664	\$6,664						
Northwood-Hatton	\$2,000	\$2,000			\$2,500	\$2,500	\$5,000	\$5,000			\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
Bismarck Miller Elementary	\$1,000	\$1,000	\$2,000	\$2,000			\$2,500	\$0								
Rugby Public School	\$1,200	\$1,200														
	\$35,052	\$31,383														
Fargo Kennedy Elementary			\$965	\$965												\$2,000
MSU-Bottineau			\$1,800	\$1,800												
Grand Forks Schroeder MS			\$2,000	\$2,000												
BSC			\$7,200	\$0												
Rock Lake School			\$2,000	\$2,000	\$2,500	\$2,423										
Williston Graden Valley School			\$2,000	\$2,000												
			\$40,825	\$33,625												
Cavalier Public School					\$2,500	\$2,500										
Drayton Public School					\$2,500	\$1,420	\$1,740	\$1,740	\$2,500	\$2,500						
Wing Public School					\$634	\$634	\$555	\$555	\$975	\$975	\$700	\$700				
Sawyer Public School					\$2,500	\$2,500										
West Fargo Cheney MS					\$2,500	\$2,500	\$2,500	\$1,450	\$3,050	\$3,050	\$3,061	\$1,204	\$1,898	\$1,565	\$3,499	
West Fargo STEM Center/Liberty MS					\$2,500	\$2,454	\$2,500	\$2,500			\$3,100	\$1,196	\$3,500	\$3,140	\$3,499	
Minnewaukan Public School					\$1,620	\$1,620										
Valley City Public Schools					\$2,500	\$2,416							\$1,900	\$1,900		
					\$46,634	\$42,714										
NDSCS							\$10,000	\$0	\$6,100	\$6,093	\$8,000	\$7,155	\$6,570	\$6,410		
Grafton Middle School							\$2,500	\$2,500	\$1,536	\$1,536	\$1,998	\$1,998				
Hankinson Public School							\$2,500	\$2,500	\$900	\$310						
North Valley CTC							\$2,000	\$1,096	\$3,500	\$1,289	\$3,500	\$0				
Bismarck Public Schools							\$2,498	\$2,466	\$2,000	\$2,000	\$2,900	\$2,891			\$558	
Devils Lake Public Schools							\$2,500	\$2,500					\$1,465	\$1,543		
Fargo Ben Franklin MS							\$2,319	\$1,357								
VCSU							\$4,350	\$4,350			\$6,650	\$2,248				
							\$65,885	\$50,437								
Dickinson Public Schools									\$2,364	\$2,223						
Carl Ben Eielson Middle School									\$1,691	\$1,609	\$950	\$950	\$1,484	\$954	\$933	

1/3

Grants for Innovation History

West Fargo Sheyenne Center				\$1,440	\$1,440			\$2,701	\$265	
Hillsboro High School				\$2,100	\$600					\$1,100
Simle Middle School				\$1,790	\$1,523					
Thompson Public School				\$2,000	\$1,975					
Wachter Middle School				\$2,000	\$2,000			\$2,000	\$1,817	
Ashley Public School				\$2,000	\$2,000					
Bismarck Career Academy				\$2,500	\$2,500	2,489	2,489	\$1,183	\$1,137	
				\$60,500	\$53,297					
Northstar Public School						\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
Northstar Public School						\$2,000	\$1,822			\$2,000
West Fargo High School						\$3,003	\$3,003	\$3,500	\$3,500	\$3,500
Larimore Public School						\$1,685	\$1,685			
Grimsrud Elementary School						\$2,000	\$2,000	\$1,963	\$1,019	
Washburn Elementary School						\$1,715	\$1,715			
Highland Acres Elementary School						\$1,999	\$1,999			\$1,843
						\$64,502	\$51,724			
Dickinson State University								\$6,573	\$4,129	\$7,400
Barnes County North								\$2,500	\$2,500	\$2,500
NESC/TLT								\$2,000	\$2,000	
								\$56,236	\$48,878	
Fargo Discovery Middle School										\$3,500
Northern Cass Public School										\$3,500
Hazen Elementary School										\$1,999
Mandan High School										\$1,971
Youth Correctional Center										\$2,000
										\$59,217

STEM Innovation and Integration Matching Grants (FY 2014 & 2015)

School District	Contact Person	Industry Partner	Grant Amount	Reimbursed	Students Served	Brief Description
West Fargo	Jane Laux	Century Link	\$3,289	\$3,289	103	Involvement with the Ecybermission Project at Liberty Middle School
West Fargo	Adam Gehlhar	Verizon	\$11,617			Integrate coding, 3D printing and improved STEM Core into the curriculum through, Scratch Day, LEGO robotics, MELD Workshop PBL and STEM SEPUP and a subscription to Defined STEM at Cheney and Liberty Middle Schools
Williston	Jason Germundson	SM Energy, ASK Transportation Inc., Vestal Properties, LLC	\$5,750			Expand EbD offerings at the high school by 3 additional classes and incorporate EV3 robotics into these courses
Bismarck	Paul Keidel	Bobcat Corporation	\$15,000			Think Forward Certified instructors, STEM Seminar Class at the Career Academy, EV3 Robotics at the 6th grade, teacher-educator connection with University of Mary
Wahpeton	Ned Clooten	Cargill, ComDel Innovation	\$15,000			Add PLTW Gateway in the middle school and PLTW classes Introduction of Engineering Design and Principles of Engineering in the high school
Alexander	Leslie Bieber	QEP Resources	\$11,500			Add PLTW Launch in the elementary school in grades 4-6
New Town	Marc Bluestone Sr.	QEP Resources	\$15,000			Add PLTW Launch in the elementary school in grade 5
McKienzie County	Steve Holen	QEP Resources	\$15,000			Add PLTW Launch in the elementary school in grade 5
Grand Forks	Eric Ripley	Northrop Grumman Corporation	\$7,500			Add PLTW Gateway in the middle school in grade 6
TOTALS			\$99,656	\$3,289	103	

STEM Infusion Initiative (STEMii) Report Update

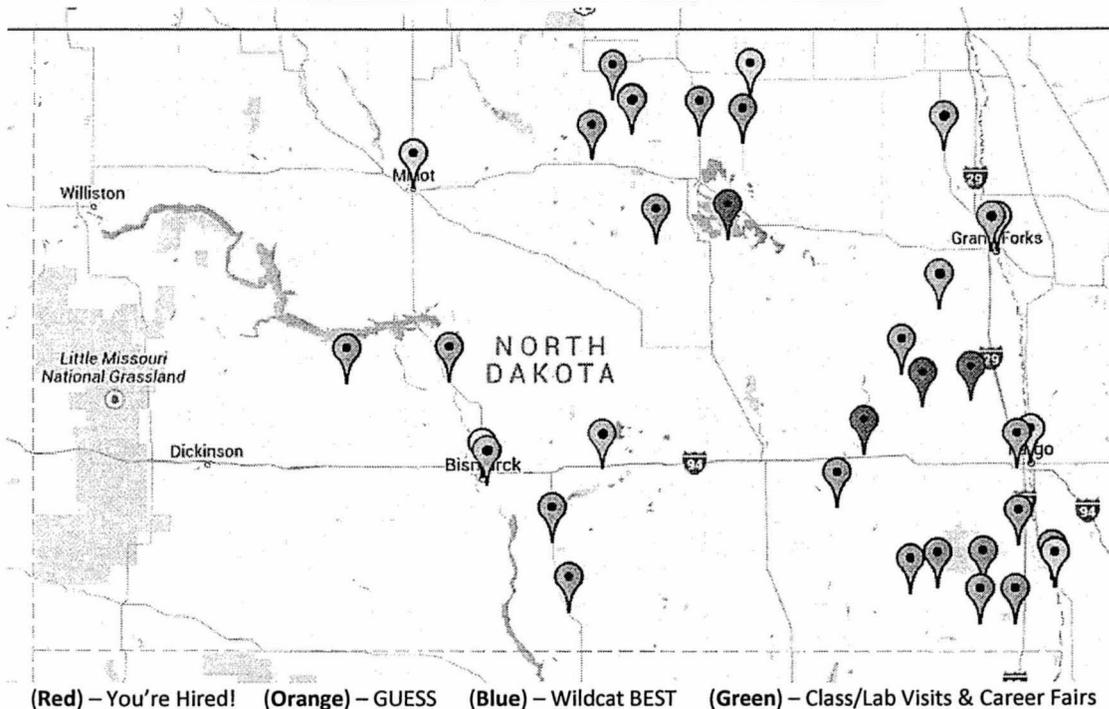
August 1, 2013 – December 31, 2014

Project Goals:

STEMii will create a transformative educational experience and provide the path for students to become gainfully employed in STEM-based workforce. Building on the success of current NDSCS outreach activities, NDSCS will enhance identified STEM-based programs to increase enrollment and retention of students by engaging them through active learning. These efforts will then focus on two sets of activities: (1) recruitment and engagement and (2) retention and successful 2-yr college graduation.

Accomplishments to Date:

Deliverables 1 and 2 – number of students served and schools receiving services to date
 NDSCS STEM Outreach reaches across North Dakota!



2013 – 2014 School Year

Name of school	New school for 2013-2014	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Beulah MS		111			
Bismarck HS			10		
Central HS, Grand Forks	X				110
Cheney MS, West Fargo		363			

North Dakota State College of Science
 STEM Infusion Initiative (STEMii)
 8/1/2013 – 8/1/2015
 Contact: Dr. Kristi Jean

Name of school	New school for 2013-2014	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Fargo North & South HS					28
Four Winds Community HS				18	
Grafton HS			11		
Grand Forks 8 th & 9 th graders			25		
Hankinson HS		123			
Hatton	X		9		
Hazleton-Moffit-Braddock HS	X	19			
Health, Tech & Trades Career Fair, Fargo					300
Hope-Page HS	X	71		16	
Liberty MS, West Fargo	X	124			
Lidgerwood HS		68			
Litchville-Marion HS	X	52			
Maddock Public School	X	76			
Milnor HS	X	81			
Minot HS					94
Munich HS	X				30
North Sargent HS	X	93			
Northern Cass HS				17	
North Star, Cando		9			
North Valley Career Fair, GF					200
Red River HS, Grand Forks	X				75
Richland 44 HS	X	131			
Rolette HS		9			
Rugby HS		9			
Schroeder MS, Grand Forks	X				20
Sheyenne HS, West Fargo		23			
Simle MS, Bismarck			16		
South MS, Grand Forks	X				20
Starkweather HS		9			
Steele HS	X		11		
Strasburg HS	X	70			
Valley City HS				21	
Wahpeton HS					8
Wahpeton MS		191		12	
Washburn HS	X	111			
Wolford HS		9	3		
Wyndmere HS		83			
Total Schools Served = 40 (excluding career fairs)	17	1,826	85	84	652

*description of activities follows

2014 – 2015 School Year (as of December 2014)

Name of school	New school for 2014-2015 (fall)	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
Beulah MS		115			
Cheney MS, West Fargo		308			
Girl Scout STEM Event					28
Grand Forks 8 th & 9 th graders			18		
Liberty MS, West Fargo		92			
Lidgerwood HS		80			
Lisbon HS	X				51
LRSC Occupational Fair, Devils Lake	X				500
Maddock Public School		72			
MCC, Minot	X				82
Milnor HS		75			
North Sargent HS		99			
Northern Cass HS					14
Sheyenne HS, West Fargo		69			
Simle MS, Bismarck			20		
Wahpeton HS					200
Wahpeton MS		73			
Wyndmere HS		95			
Total Schools Served = 15 (excluding career fairs)	3	1,078	38		875

**description of activities follows*

Note: Student contacts for 'You're Hired!' program can include repeating students from the 2013-2014 school year as some schools have multiple grades participating. GUESS numbers are new student contacts.

STEMii Impact To-Date

Year	Total Schools Served (excluding career fairs)	You're Hired* # students	GUESS* # students	Wildcat BEST Robotics*	Class/Lab Visits & Career Fairs*
2013-2014	40	1,826	85	84	652
2014-2015	15	1,078	38		875
Total (as of December 2014)	55	2,904	123	84	1,527

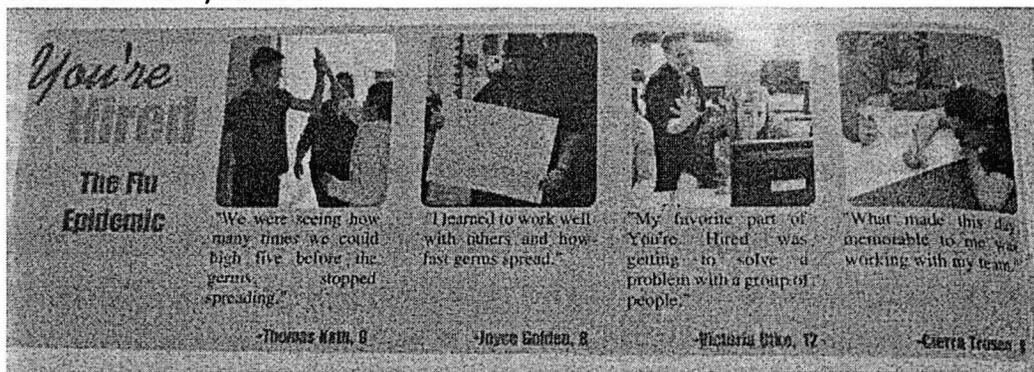
You're Hired! Project Update:

'You're Hired!' (YH) is a coherent series of STEM-focused, day-long activities that require students to work as a 'company' for an entire school day to find a solution to a relevant, present-day problem and then communicate their discovery to a community-led boardroom, comprised of school administrators, school board members and local industry representatives. Examples of present-day problems include using a nano-coated sand to clean up oil spills, calculating reaction times to determine first-hand the dangers of texting while

driving, and building a nightlight circuit on an electronics breadboard to test and calculate the amount of energy that can be saved by switching from incandescent to LED light bulbs. YH is experiencing wide acceptance within our secondary schools as educators see this project as a method to provide a STEM experience and assess 21st Century Skills without overburdening their existing resources. A total of 2,904 students from the 32 schools listed have conducted 1 to 3 STEM days since August 1st 2013. All of the schools participating to date for the 2014-2015 school year are returning schools.

The project is generating positive comments from a variety of sources.

- 'I like STEM day. It is challenging, yet fun. It stresses me out, but in a good way.' – *Wyndmere student.*
- At the end of this report, we are also including newspaper articles from Hankinson, Wahpeton, Hope-Page and Strasburg HMB. You're Hired even made the Hankinson yearbook:



- 'I'm also excited to see our STEM project days are spilling over into the rest of the district. The 4th grade is having a STEM day based on the 3 Little Pigs and the students have to design a house from the same choices the pigs had and see how it stands up to a wind source.' *Patty Mosset, Beulah MS teacher 10/01/2014*
- 'My 5th graders are already excited for the Math Olympics and it's only December! All of you involved did an outstanding job. My students really enjoy Mathematics and the Math Olympics are a big reason why. Thank you!' *Matt Pfeifer, Sargent Central Teacher*
- 'I say we pilot it and see what happens.' – In regards to piloting a 'Skype' boardroom. NDSCS physics students as used Skype to watch YH presentations and deliver immediate feedback to the students. *Scott Strenge, Wyndmere HS*

Schools have been inviting neighboring schools to the boardroom, which resulted in new schools signing up late in the spring semester, such as North Sargent, Litchville-Marion and Milnor. 'I had a teacher at the Hankinson STEM day and she was very impressed with the opportunities it gives students. She described it as "everything we try to teach kids." I'm very interested. What information can you get me to get it off the ground here in Milnor?' *Chris Larson, Milnor HS Principal 3/11/2014* Shortly after Milnor conducted their first STEM day, we received the

following: 'The response has been great here. When can I get on the schedule for next year?'
(4/22/2014)

On 11/06/2014 a new boardroom approach was piloted at Wyndmere High School in Wyndmere, ND. Instead of having community members physically go to the school to judge presentations and provide immediate feedback to the students, Skype was used to accomplish the same task in a virtual setting. Students had to think outside of the box to make sure that they were presenting their solutions and ideas in a format that would work with their new audience. The boardroom consisted of NDSCS physics students that were located in Wahpeton, ND. These NDSCS boardroom judges had the opportunity to listen to the student presentations, ask questions based on the presentation, and provide immediate feedback to the companies. With the success of this new boardroom approach future boardrooms could include professionals from not only the immediate surrounding area, but from across the state and beyond.

GUESS Project Update:

The GUESS Project's mission is to promote girls' interest in STEM careers. Girls spend a 'day at the lab' doing hands-on experiments focused around the emerging technology areas of Nanoscience, Biotechnology, Microelectronics and Engineering. Once the girls have completed the GUESS What project, they can participate in GUESS Again, which uses the same 'day at the lab' model, but has a welding focus. This project has been shown to be statistically significant in increasing interest in STEM as well as shown girls enrolling in welding.

Both GUESS and GUESS Again use the same model in reaching 8th and 9th grade girls. The daylong event is run by women professionals and includes hands-on experiments for schools across North Dakota. In the 2013-2014 school year, 85 students and 10 teachers have been impacted by GUESS (Girls Understanding and Exploring STEM Stuff).

Two GUESS events took place the fall of 2014 that impacted 38 students and 4 teachers. Also in the fall of 2014 work was done to develop GUESS events that will be located on the NDSCS main campus in Wahpeton, ND. The main campus GUESS events will include sessions focused around Robotics and Mechatronics, Precision Machining, Welding Technologies, as well as Microbiology, Microelectronics, Engineering and more. The new GUESS events will have greater access to influential college students to act as assistants and instructors as well as a broader diversity in the session topics. Participants will have a chance to create multiple keepsakes from the day which have been a huge highlight mentioned from returning teachers. Work has also been done in the fall of 2014 to focus less on a specific age of students (8th and 9th grade girls), and instead focus on working with the technology teachers from the various schools to connect with the girls that are going to be eligible to take the CTE courses offered in the next semester.

Wildcat BEST Robotics Update:

The BEST (Boosting Engineering Science and Technology) Robotics mission is to inspire students to pursue careers in engineering, science, technology, and math through participation in a sports-like science- and engineering-based robotics competition. This competition lasts for approximately six weeks with a kick off day in September, a mall day (to practice) in October

held one week prior to the competition, and the competition day at the end of October modeled after a sporting event.

For the 2013 season, we started the season with 10 teams participating and over 150 students and teachers. By game day (Nov 1, 2013), we had 6 schools participate with 120 students. The game day participating schools (including two Minnesota schools): Hope/Page, St. Josephs (MN), Valley City, Breckenridge (MN), Ft. Totten, Northern Cass. For the 2014 season, NDSCS provided referee and judging support for the NDSU Bison BEST competition. Wildcat BEST Robotics did not have a 2014 season.

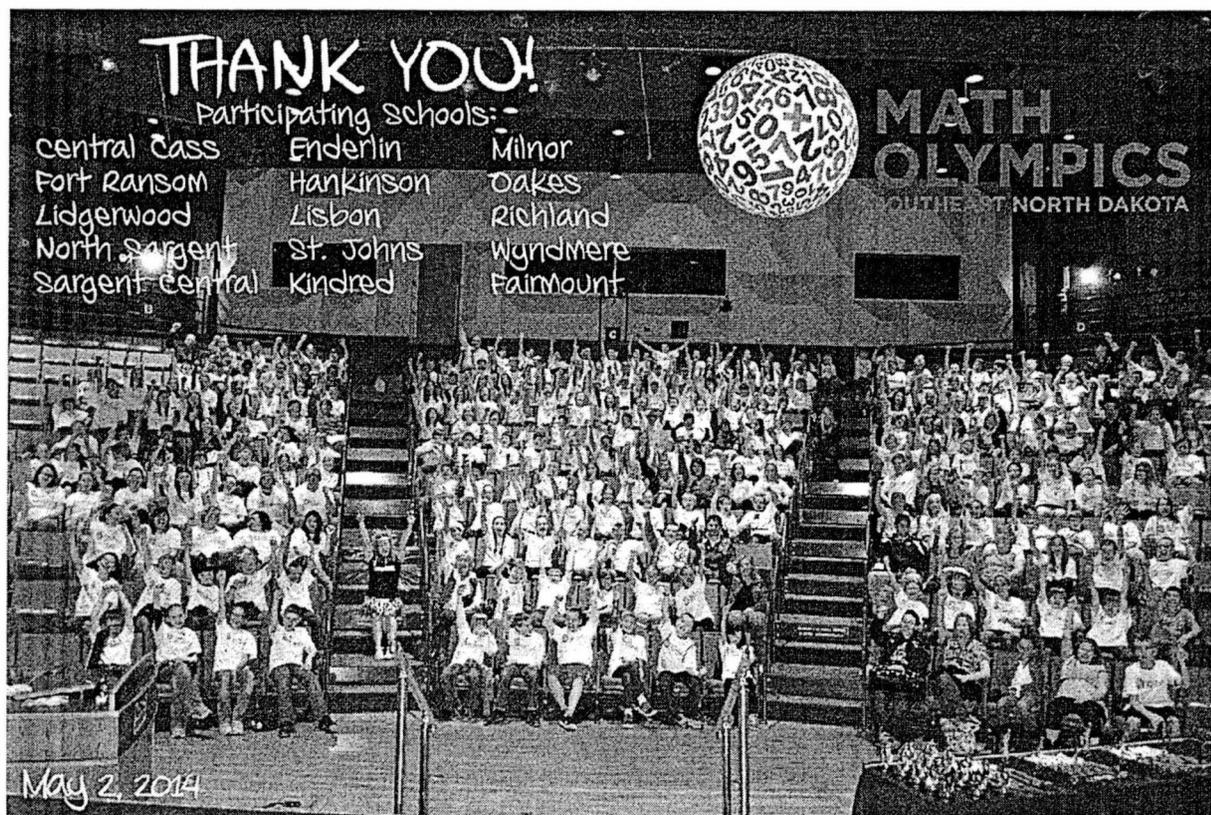
Classroom and/or Lab Visits:

The Center for Nanoscience Technology Training hosts tours for secondary schools on a request basis. Students enjoy doing hands-on activities in any of the four areas: nanoscience, microelectronics, biotechnology and engineering. The day is tailored to the needs of the teacher/class. School classroom visits are also conducted as resources permit, with the activities once again tailored to the needs of that classroom.

Sept 26, 2013: Fargo North/South health careers class (28 10th-12th graders, biotechnology)
Oct 24, 2013: Minot (94 11th-12th graders, microelectronics)
Nov 7, 2013: Munich (30 7th-12th graders, nanoscience)
Nov 13, 2013: North Valley Career Fair Grand Forks (200 10th graders, nanoscience and microelectronics)
Dec 12, 2013: Health, Tech & Trades Career Expo Fargo (300 9th graders, nanoscience and microelectronics)
Feb 18, 2014: West Fargo Insourced Professional Development (324 MS and HS teachers, 2-yr career options presentation)
Feb 18, 2014: West Fargo Insourced tour (20 teachers, nanoscience)
Feb 19, 2014: Wahpeton High School (8 11th-12th graders, nanoscience and microelectronics)
Mar 19, 2014: South Middle School, Grand Forks (20 8th graders, nanoscience)
Mar 19, 2014: Red River High School, Grand Forks (75 10th-12th graders, biomedical technology)
Mar 24, 2014: Technical Student Association (TSA) Conference, Bismarck (100 students from multiple ND schools, biomedical presentation)
Mar 26, 2014: Schroeder Middle School, Grand Forks (20 8th graders, nanoscience)
Mar 26, 2014: Central High School, Grand Forks (110 10th-12th graders, biomedical technology)
Apr 24, 2014: ACTE Conference (20 HS teachers, You're Hired presentation)
May 2, 2014: Southeast Math Olympics (220 4th -6th graders from 15 elementary schools)
May 19, 2014: Marketplace for Kids (100 4th - 6th graders from 8 elementary schools, microcontrollers)
June 9, 2014: Career Awareness Seminar (40 HS teachers and counselors, STEM)
June 11, 2014: EDC Professional Development (12 HS teachers, nanoscience)
Aug 6, 2014: National Agriculture Genotyping Site Visit and Tour (NDSCS-Fargo)
Sept 10, 2014: LRSC Occupational Fair (500 students from Devils Lake area schools)
Oct 22, 2014: Manufacturing Day – STEM (200 juniors and seniors from Wahpeton HS on NDSCS Main Campus)
Nov 15, 2014: STEM Girl Scouts Event (28 girls at NDSCS Main Campus)

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Nov 21, 2014: Microelectronics with Physics Students (82 Minot HS students)
Nov 25, 2014: A&P Lab Tour (80 1st and 2nd year NDSCS biology students at NDSCS-Fargo to learn about variety of STEM programs)
Dec 4, 2014: Fargodome Career Fair



Deliverable 3 – business and industry partnerships assisting in STEMii (funding, speakers, tours, internships, job shadows, etc.)

- \$9,500 total donation from AT&T to support the GUESS project
- Meetings with Elinor Coatings, Aldevron, Vicon Coatings, Cass County Electric Cooperative, United Way Cass-Clay, and Hidden Value Consulting to discuss funding and partnerships
- ComDel Innovations, Red River Valley Railroad, and Giant Seeds donating to support SE Math Olympics
- Partnering with Denise Jonas, CTE Director – Cass County Career & Technical Education Consortium on a non-traditional grant to provide a 'Girls in Aviation' themed GUESS activity that will be held January 30, 2015 at NDSCS-Fargo Campus.
- Presenting STEMii work at CTE Memorial Hall on January 28th, 2015. A teacher from Beulah MS will be bringing the winning teams from their first YH activity to participate in the STEMii exhibit. Students will have the opportunity to spend the day in Bismarck and conduct fun hands-on experiments in Memorial Hall.

Deliverable 4 – students enrolling in targeted CTE programs

The first year of the STEMii project will result in students enrolling in targeted CTE programs during the 2014-2015 school year. Data from the students enrolling in targeted CTE programs will be provided with the next report, based upon actual fall enrollment numbers.

CTE Dual-Credit Enrollment:

- Grand Forks Career and Tech Center
Grand Forks Career and Tech Center will launch Spring 2015 a pilot, dual-credit Biomedical Technology course. A specific focus from the Grand Forks GUESS girls' event in January was targeted enrollment for females into the Biomedical Technology class. These girls experienced hands-on activities that directly aligned with the course content they can expect to see in the Biomedical Technology course, with the future instructor of the course being a very visible active mentor in the GUESS day. This increased the interest and confidence the girls need to feel like they can be successful in this course.

NDSCS Engagement:

- NDSCS Faculty STEM Cohort
In order to increase student engagement and hands-on STEM activities, we will be assembling a cohort of NDSCS faculty (early adopters) who will be working directly with the STEM Outreach Specialist to bring more hands-on engaging female friendly projects into their classrooms and/or outreach activities.

Additional Information

STEMii funding support is used only for personnel expenses. All operating, equipment and travel are covered by non-STEMii funding.

Kristin Brevik has been hired to fill the NDSCS STEM Outreach Specialist position. Her start date was September 2, 2014.

#3
3/9/2015

Testimony in SUPPORT- HB 1393
Matthew Leiphon- North Dakota STEM Network

March 9, 2015

Chairman Flakoll, members of the committee,

My name is Matthew Leiphon, and I work with the management team of the North Dakota STEM Network. I am here today to testify in SUPPORT of passage of House Bill 1393. The funding provided by this bill will enable North Dakota's STEM stakeholders, from business, economic development and education, to continue to work to find new and innovative ways to prepare our state's students for careers in growing, science, technology, math, and science (STEM)-related industries.

The ND STEM Network works to connect and increase cooperation throughout the state in order to provide opportunities for students to be creative, innovative, and prepared for careers in STEM. The Network's leadership is committed to ensuring STEM education is responsive to real-world opportunities and needs, engaging business as a key partner. By ensuring industry has a seat at the table, the STEM Network helps provide educators with valuable guidance and access to resources from the private sector, helping our teachers better prepare students for STEM-related jobs with North Dakota companies.

North Dakota's rapidly growing and changing economy is causing increased demand for a STEM-ready workforce, with new and expanding industries creating job openings requiring strong STEM-skillsets. According to analysis conducted by the Network, North Dakota led the nation in growth of STEM jobs between 2004 and 2014, adding 37% to its STEM workforce of engineers, technicians, and scientists. Despite this growth, North Dakota remains towards the bottom for

concentration of such jobs. STEM jobs represented just 3.3% of all jobs in North Dakota in 2014, ranking just 44th among all the states. As North Dakota's economy grows, diversifies, and new industries emerge, it's projected that the state will need to fill 8000 new, highly-skilled STEM jobs by 2022. There is strong demand, but the state still trails others in STEM jobs. This shows the strong need to invest in initiatives to strengthen the state's STEM education system and to build ties to industry.

Providing North Dakota's young people with access to top-quality STEM education opens the door to great careers. STEM jobs tend to be high-paying. According to analysis conducted by the Network, the median hourly pay for all STEM jobs in North Dakota in 2014 was nearly \$28 per hour. That's nearly \$10 per hour more than the overall median pay of \$18.50. Professions requiring four year and advanced degrees, such as engineers and physical scientists, are some of the highest paid positions, but technician-level occupation groups also offer great pay, opening opportunities for students who choose other educational paths.

Making sure our students are well-prepared for these cutting-edge careers will require coordination of efforts between our state's educators and business leaders. The best way to meet our workforce needs and create economic opportunity for our citizens is to develop a pipeline of talent from within. By working together, the state can "punch above its weight" in building a strong, career-ready workforce. Building partnerships will take resources, however, which is why funds provided by House Bill 1393 are so important.

Today, teachers, educators, and STEM practitioners are active in pockets throughout the state, rolling out innovative programming designed to prepare students for the STEM economy. With so many different activities and entities operating independently around the

state, there is a degree of fragmentation of efforts. The STEM Network's goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that connect and coordinate private and public sector STEM projects.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a focus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network is in the process of building a foundation for something that has taken years and decades to build up in other states. The efforts to add structure to the network over the past year are supporting teachers in their ongoing delivery of STEM education, strengthening existing connections between business and educators.

Building these connections can't be the responsibility of the state alone. Creating a strong network will require investment and commitment from the private and public sectors. Over the past year, we've met and worked with multiple businesses throughout the state. We've also hosted regional meetings bringing together educators, policymakers, economic developers, and business leaders to discuss ways to work together. Companies including Bobcat, KLJ, Northrop Grumman, and Microsoft have kindly hosted or participated in these events, providing an opportunity for collaboration and engagement.

In addition to hosting regional events, the Network has been involved in several other activities to build STEM business-to-education partnerships:

- Hosting a statewide conference with the support of industry and other sponsors attended by close to 150 educators, business leaders, economic developers, and industry representatives;

- Performing one-on-one outreach meetings with employers to gather information and advocate for industry support of STEM initiatives and advancement of STEM workforce development, and;
- Producing economic, workforce, and data analysis reports by industry and occupation to provide stakeholders and policymakers with valuable information on STEM workforce needs and trends.

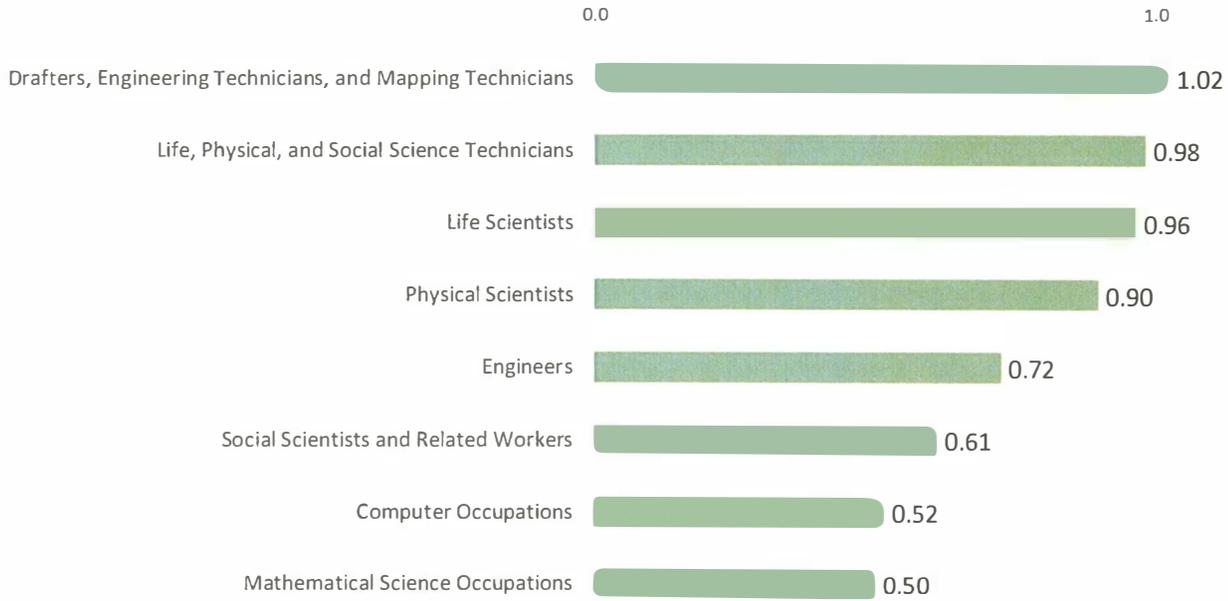
Over the next two years, the STEM Network will continue to build on these efforts to build industry-education exchanges, working with business to host meetings, gather input, build connections with educators, and create new partnership opportunities.

The Network plans to continue to actively pursue outside resources to supplement the state's investment. The Network has founded a nonprofit organization, and is in the process of seeking federal 501c3 status in order to better position the initiative to pursue outside resources. Our goal is to use industry support as a model for long-term sustainability, supported by grant funding, donations, and other private sources of support and funding.

By passing HB 1393, North Dakota will be investing in stronger industry-education ties, highlighting the work of innovative STEM educators, and pursuing expanded industry and grant funding and support. The Network is a connection between the state's already active education and economic development activities. By working together, this public-private partnership can build a foundation for strong careers for our state's citizens and a strong economic future for our state.

The state lags the national average in all other occupation categories, but most acutely in social scientists, computer occupations (even though this is the largest of the eight groups) and mathematics jobs. The state is rapidly adding engineering jobs, yet it remains 28% below national average in concentration of engineers.

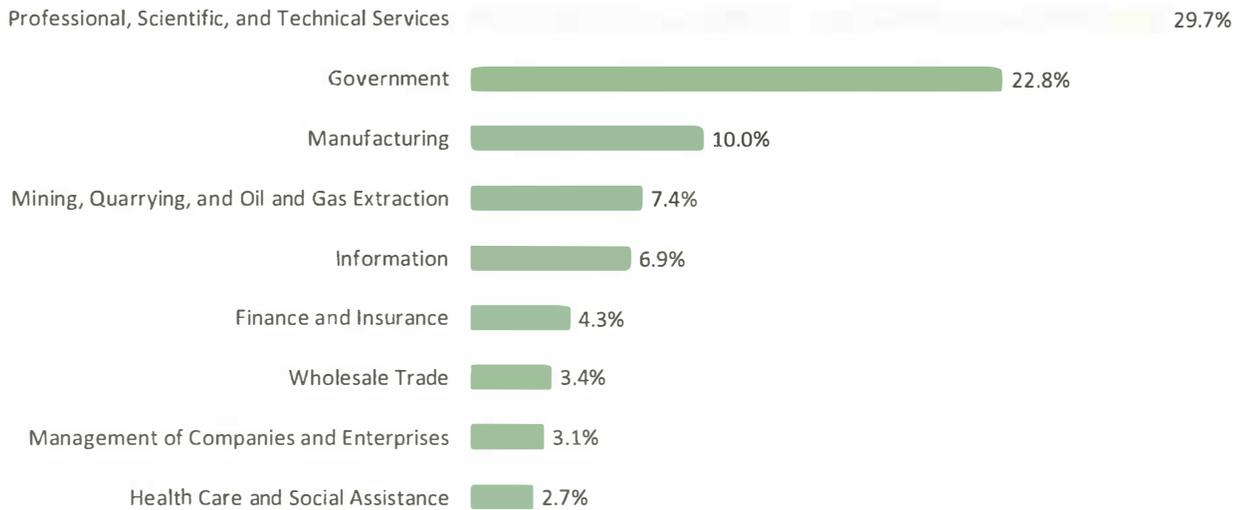
ND STEM Occupation Concentration, 2014



More than a quarter of all STEM workers in North Dakota are employed by professional, scientific, and technical services firms. These include high-end business-to-business services sectors such as engineering services and consulting. Another 22% of STEM workers are employed by local, state, and federal government agencies. Manufacturers account for another 11% and the mining and extraction sector another 9%.

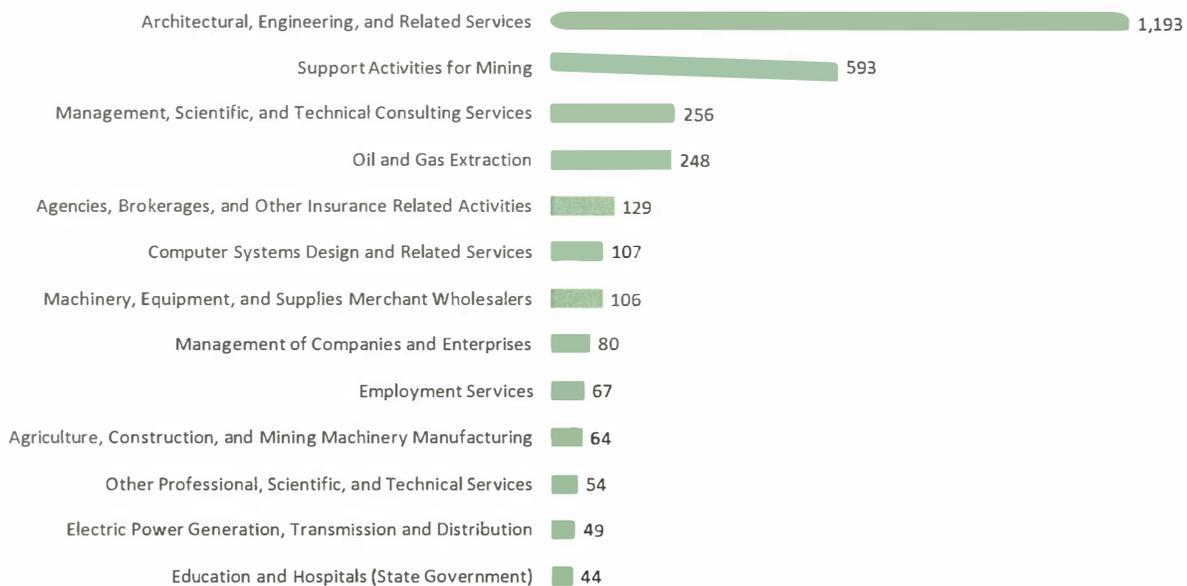
Where are the STEM jobs?

ND STEM Jobs by Industry, 2014



Drilling down in to particular industries and the number of new STEM jobs in each, architecture and engineering services firms led the way with nearly 1,200 new jobs in the past five years. The support activities for mining added another 600 and extraction another 250 STEM jobs.

STEM Growth Industries, 2009-2014

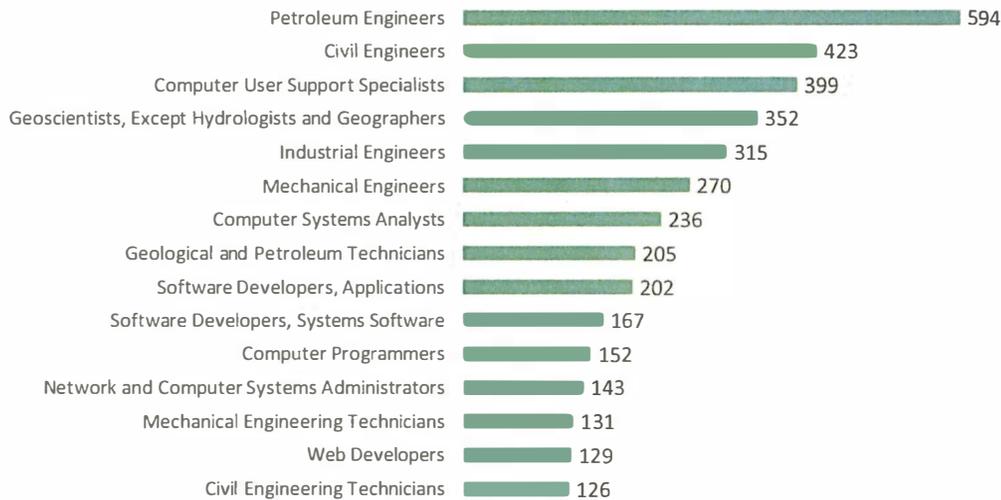


Job growth is one major driver for labor force demand, but retirements and general job churn also are a source of job openings. The following chart lists overall openings for STEM occupations since 2010 and projected to 2015. The effect of the energy boom is apparent with the need for nearly 600 new petroleum engineers and many more civil engineers,

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geoscientists, industrial, and mechanical engineers. Other active occupations include computer and information technology-related jobs, a good sign as this sector is currently underdeveloped in North Dakota.

STEM Openings, 2010-2015



Adjusting degree production for the size of the state, North Dakota is one of the nation's most significant talent producers. The following table lists the state's degree production for the state's largest STEM-related degree programs over the past decade. The right-hand column charts a trend line of degrees awarded for each program since 2003. The state is seeing rising production across many degree categories.

ND STEM Degree Production

Program	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Trend Line
Mechanical Engineering	136	154	140	153	146	139	137	136	148	136	196	
Electrical Engineering Technologies/Technicians	90	124	111	146	168	125	161	212	136	143	167	
Biology, General	129	119	122	145	150	163	136	141	178	161	159	
Clinical/Medical Laboratory Science/Research and Allied Professions	53	41	51	88	128	116	138	150	168	150	157	
Industrial Production Technologies/Technicians	119	131	135	135	114	134	170	212	213	163	140	
Civil Engineering	122	149	85	116	85	113	98	107	127	122	125	
Electrical, Electronics and Communications Engineering	95	83	110	102	98	106	108	104	97	114	116	
Management Information Systems and Services	135	157	119	82	75	73	81	90	156	106	107	
Zoology/Animal Biology	52	60	67	76	83	74	71	50	74	88	94	
Computer Science	9	65	74	64	49	66	64	77	75	92	84	
Computer and Information Sciences, General	229	159	129	116	86	86	89	110	84	71	69	
Mathematics	51	43	47	48	45	49	56	59	49	61	54	
Chemistry	53	52	51	29	55	53	50	39	54	61	50	
Microbiological Sciences and Immunology	23	18	36	29	20	19	25	27	32	38	49	
Computer Engineering	2	6	7	14	15	18	23	32	14	21	44	
Industrial Engineering	28	22	27	22	25	21	23	32	35	46	40	
Chemical Engineering	11	23	22	37	22	24	22	36	32	23	31	

STEM jobs tend to be high-paying. Median hourly pay for all STEM jobs in North Dakota in 2014 is \$27.90. Engineers are the highest-paying of the eight categories at \$35.11, followed by physical scientists and mathematicians. The technician level occupation groups also offer good pay, with median pay for engineering technicians at \$22.38 and life and physical science technicians at \$19.04. However, there remains room for STEM job pay in North Dakota to increase. The

following table compares pay in the state to a baseline average of nine surrounding states. Pay for technicians in North Dakota is generally competitive, particularly life science technicians and entry level engineering techs. However pay lags in many other categories, marked most acutely by computer jobs where 10th percentile workers make 82% of the regional average and those in the 90th percentile just 74% of workers across the region.

ND Pay vs. 9 Upper Plains States, 2014

Description	Pct. 10 Hourly Earnings	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings	Pct. 90 Hourly Earnings
Computer Occupations	82%	80%	77%	76%	74%
Mathematical Science Occupations	85%	83%	78%	76%	83%
Engineers	88%	89%	88%	88%	89%
Drafters, Engineering Technicians, & Mapping Technicians	99%	94%	91%	91%	90%
Life Scientists	90%	90%	95%	92%	89%
Physical Scientists	105%	93%	86%	81%	76%
Social Scientists & Related Workers	88%	82%	87%	91%	90%
Life, Physical, & Social Science Technicians	98%	96%	98%	102%	100%
Total	87%	84%	82%	82%	80%

STEM NETWORK ACTIVITIES IN 2014

Teachers, educators, and STEM practitioners are active in pockets of the state. Discussions with North Dakota employers and the statistics suggest that we need to continue to elevate the delivery and prevalence of STEM education and activities throughout the state. An educated STEM workforce is important in creating a robust diversified economy. The best way to meet our workforce needs and to create opportunity for our citizens is to develop a pipeline of talent from within.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a nexus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network is in the process of building a foundation for something that has taken years and decades to build in other states. The efforts to add structure to the network over the past 10 months are supporting teachers in their ongoing delivery of STEM education and strengthening existing and forging new connections with partners in industry.

The STEM Network has been established as an independent organization to leverage and enhance North Dakota's existing investments in K12 and higher education and in workforce and economic development. Over the last 12 months, the Network has been involved in several activities to support ongoing STEM education efforts and to build connections between the business and the education communities:

- **2014 STEM Summit** – attended by close to 150 educators, business leaders, economic developers, and industry representatives.
 - o Provided a venue for sharing of efforts between educators and employers
 - o STEM Professional Development workshops for educators
 - o Nationally renowned experts and leaders showcasing best practices and techniques for STEM education
 - o Forged connections between the state's top STEM teachers who are often isolated in their home school districts
- Hosted **Four Regional Network meetings** throughout the state
 - o Attended by educators, private business people, economic development professionals, and state lawmakers
 - o Showcase innovated STEM programs in each region

- Enlighten economic developers and industry as to what is going on in classrooms and afterschool activities and how they can engage and support in a meaningful way
- Disseminate current labor market information about state STEM job trends
- Incorporated the STEM Network as a ND non-profit and working towards federal 501c3 status
- Performed 1-on-1 outreach meetings with employers advocating for industry support of STEM initiatives and advancement of STEM workforce development
- Public support and communications efforts
 - Next Generation Science Standards white paper
 - Shared STEM news, grant and resource opportunities, and other information across the state
- Produced economic, workforce, and data analysis reports by industry and occupation for ND regions and statewide to get data in the hands of state policymakers. Information was delivered in written reports and in-person presentations. Topics in 2014 included North Dakota STEM Economy Report, ND Oil & Gas Extraction Employment Summary, Women in Construction Across the Great Plains, UAS Industry Analysis, Minot Economic and Workforce Analysis, and various Regional Analyses.

STEM NETWORK GOALS

There are many great STEM education activities and resources available in pockets across the state. Several districts host FIRST and Bison Best Robotics teams and other afterschool activities. Other districts are delivering STEM classroom curriculum like Project Lead the Way, classroom career development days like “You’re Hired”, professional development workshops delivered by universities in the state and a host of other activities. The innovative Teachers in Industry program is placing teachers in a business for one month each summer.

With so many different activities and entities operating independently around the state, there is a degree of fragmentation of efforts in silos of activity. North Dakota is a small state, but it can use its size to its benefit by focusing on collaboration and sharing of ideas.

The STEM Network’s goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that coordinate private and public sector resources and make them easier to access. We hope to:

- ⇒ Grow the level of industry engagement with education and workforce training and create succinct linkages between educators and industry
- ⇒ Connect teachers with teachers to share curriculum and program ideas across the state
- ⇒ Use industry support as a model for ND STEM Network long-term sustainability, supported by grant funding, donations, and other private sources of support and funding
- ⇒ Eliminate or reduce the fragmentation of activities, duplication of efforts, and increase the efficiency of resources and investments
- ⇒ Improve access to STEM career information among parents, students, and guidance professionals
- ⇒ Improve access to labor market data to support curriculum design, workforce development policy, and talent recruitment
- ⇒ Align industry workforce needs and challenges with development of education activities
- ⇒ Enhance the experience of North Dakota K-12 students using STEM education principles such as problem-based learning, multidisciplinary curriculum, and hands-on experiences
- ⇒ Complement other ongoing state workforce and educational development programs, working in partnership to improve STEM awareness and better prepare North Dakota students for the workforce

STEM NETWORK ACTIVITIES 2015-2016

Working to achieve its goals, the ND STEM Network will engage in the following primary activities.

Create Industry-Education Exchanges to connect employers with educators. The Exchange format insures that industry is represented and connected to elementary, high school, tech training, classroom activity, and afterschool activities and higher education STEM curriculum. The format provides educators with a chance to leverage connections with businesses to enhance student experiences and to increase business support of education programs. The Exchanges will comprise three main activities:

- Statewide industry roundtable meetings facilitating face-to-face discussions between STEM businesses, regional leaders, and educators.
- NDSTEMExchange.org – an online information source containing a STEM resource inventory organized by industry. The online tool will centralize information about existing STEM education, career development, and training activities already happening in the state. The site will aim to be a place where teachers can connect to business, teachers can find inspiring ideas from other teachers, and businesses can identify chances to work with educators in their region or industry.
- Interactive map of state STEM resources. This interactive map will allow parents, educators, industry partners, to locate STEM projects and resources in their region of the state. For instance an industry user may select a specific tab to find teachers interested in business mentorships.

2016 North Dakota STEM Summit. The STEM Summit is a statewide event that provides a face-to-face platform for our STEM community to connect. The event highlights the best STEM programs and practices happening in North Dakota, offers technical sessions for educators, and features exhibits and sessions about business-education connections.

STEM Economy Data for Decision Making. The ND STEM Network will continue to provide on-demand analysis of state trends and emerging job opportunities. The network will publish focused data reports and be available for in person presentations as needed by education and workforce leaders and policymakers.

Continue Regional STEM Network Meetings. The regional STEM Network meetings provide a chance to showcase what's happening in each region in more depth. Half-day regional meetings in 2014 were attended by K-12 teachers, higher education representatives, workforce and economic developers, chamber of commerce representatives, and many private businesses. These meetings showcase the STEM issues most important to each region and offer a chance to connect with new local partners outside of the STEM Summit. The STEM Network will coordinate two regional meetings in each region in the 2015-2017 biennium.

STEM Days for K-12 Students. Student engagement is critically important to ensure more high school graduates pursuing STEM professions. STEM Days are interactive events for 7th and 8th grade students to expose them to science and technology. The STEM Network will work with regional leaders to coordinate one event per year in each of the four ND STEM Network regions and one in partnership with the state's Native American Tribes. These events are modeled after the recent Tech Savvy and STEMtastic Jamestown! Events supported by the American Association of University Women and coordinated by the American Heart Association of Jamestown, the Jamestown/Stutsman Economic Development Corporation, the United State Geological Survey, the University of Jamestown, and the Great Plains STEM Education Center at Valley City State University, influencing over 360 7th and 8th grade students, and 18 teachers and paraprofessionals from those same grades.

#4
3/9/15

Bobcat Company

House Bill No. 1393

March 9, 2015

Support of STEM programs is a key focus area for Bobcat Company's community involvement initiatives. These educational and research areas help fuel innovation, which is the foundation of Doosan and Bobcat and the key to the company's continued growth and success.

In addition, STEM areas help generate community progress, which is also very important to Doosan and Bobcat. We want to help our communities grow and prosper, we want to continue creating jobs that keep smart, progressive young people in the community, so they don't have to go elsewhere to apply their talents.

Our company supports STEM at all educational levels through grants, in-class participation, production facility tours, field trips and scholarship programs.

Why STEM Education is Important to Bobcat

Bobcat employs more than 2,000 people in North Dakota, a large majority in STEM or technical trade fields. We have three factories in the state in Gwinner, Wahpeton and Bismarck. Our product design centers are in Bismarck, Gwinner and on campus at NDSU.

In July of 2014, Bobcat Company opened its Acceleration Center in Bismarck, ND. Doosan, Bobcat's parent company, has a goal of being a top-three global player in the construction equipment industry. The goal of the Acceleration Center is to accelerate innovation by focusing on research and development, product design and testing, and prototyping of designs and manufacturing processes all on one campus. Also important is the design of the facility which was built with future workforce needs in mind with no offices, an unassigned seating model, an open collaborative work environment, soft seating, gaming areas, fireplaces, a variety of meeting spaces, a large testing and prototyping lab, and an indoor driving arena. Bobcat's goal is to attract and recruit the best talent in engineering and related STEM fields. Currently, the facility is home to 180 employees in engineering, IT and various business positions. Bismarck is the center of Bobcat and Doosan innovation in North America.

Bobcat's Involvement

Bobcat recognizes that in order to drive top talent to our business, we must be involved in community efforts geared toward students during their K-12 educational career. We have enhanced our outreach efforts by hosting and participating in several events recently:

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Introduce a Girl to Engineering Day

In February, this event was held in Fargo, ND in partnership with Fargo Public Schools, NDSU, John Deere, KLJ, Moore Engineering and Bobcat Company. This was a daylong event in which roughly 80 8th grade girls volunteered to participate. The girls were assigned to a company and were able to spend the morning at that company completing engineering related projects and listening to female engineers talk about their careers. The day concluded with lunch at NDSU, a third engineering project and the opportunity to ask questions of female engineering students at NDSU.

FTC Robotics

Bobcat provided time and money to three FTC robotics teams in Bismarck, ND this year. We mentored teams at three schools: Shiloh Christian School, Bismarck Career Academy and St. Mary's High School. The Shiloh Christian School team advanced to the Super Regionals this month in Des Moines, IA. We also invited the three teams to the Acceleration Center for a tour so they could see the engineering design process first hand and talk to some of Bobcat's engineers.

Teachers in Industry

Bobcat was the first company in Bismarck to host Teachers in Industry. We had two teachers during the summer of 2014 working as interns at Bobcat; one middle school Science teacher who was assigned to a Program Manager and one 4th grade teacher who was assigned to work with our Acceleration Center Director. The experience proved very valuable for both parties. The teachers were able to learn about the engineering design process and how to incorporate it into projects they do in their classrooms. The Bobcat employees were inspired by the opportunity to share what they do and see it come alive in the classrooms of young students. We later hosted the fourth grade class at the Acceleration Center for a Lego Robotics challenge. The engineers that attended that day were so impressed by the questions the students were asking, their thought process and how excited they were to build and present their designs. The students were amazed they were talking to real engineers.

STEM Scholarships

In order to drive more students into STEM programs, Bobcat Company has greatly expanded its scholarship programs.

In March of this year, Bobcat Company provided nine \$1,000 scholarships to students enrolled at North Dakota colleges and technical schools. Students enrolled in Precision Machining Technology, Information and Communication, Welding, Pre-Engineering and Instrumentation and Control were awarded the scholarships.

In January, Doosan and Bobcat Company announced a \$3 million donation to North Dakota State University (NDSU) to establish a STEM scholarship endowment. The donation was

matched with state funds, bringing the total gift to \$4.5 million, which is the largest gift to establish a scholarship endowment in NDSU history. This endowment will help students fulfill their aspirations in engineering and other innovation-related professions.

College Programs at Bobcat

In addition to being involved with community efforts, over 20 years ago Bobcat made a deliberate effort to provide students real work experience during their college career by establishing a large co-operative education program. Each year, Bobcat hires roughly 100 students from a variety of universities to work in this program. The majority of these students work in engineering either in design, test, manufacturing or quality. In addition to that, we have a Student Development Program at Bobcat's office on campus at the NDSU Research and Technology Park where we employ the top co-op students to work for us part-time during school. Students must apply for a position on the SDP team and if selected, may work on projects for the entire engineering team at Bobcat via a project pool system.

We created these programs to provide students an opportunity to continue to gain industry engineering experience and to drive top engineering talent to Bobcat upon graduation.

Bobcat's Future Needs

We need to continue to do more to ensure North Dakota's future workforce needs are met. Specifically at Bobcat, we have several reasons to continue these efforts:

- As our machines become "smarter", the need for individuals in electrical engineering, embedded software development and hydraulics is critical to our future product development needs.
- Almost 20% of our engineering team is eligible for retirement right now plus we have plans to continue to add positions in key areas over the next five years.
- We need to continue to drive diversity in STEM occupations by reaching out to girls and minorities to improve our business outcomes.
- We need to drive experienced engineering talent back home and attract talent from across the country. Bobcat is happy to provide opportunities to entry level candidates but there are times when we need experienced candidates. We need to drive engineering talent back home to North Dakota and offer the children of these professionals a chance at a STEM education here in our state.

Bobcat and Doosan are happy to contribute to STEM efforts in our communities. These areas help fuel innovation, which is the very foundation of our business, and it's key to our continued growth and success.

We have seen the impact the partnerships between industry and education have on students and teachers. Last summer, it was rewarding to see the teachers' understanding of engineering and

manufacturing develop while at our company. We have seen student's eyes light up after building something and testing its functionality. It is wonderful to see students connect what we teach them to educational programs in STEM and be confident enough to ask us questions about how to proceed with their education.

It is very critical to introduce these concepts to students early in their educational career to build understanding and comfort with these topics. We need to show students they can be successful in these highly technical subjects and prepare them for the rigor of the programs going into college.

The STEM efforts across the State of North Dakota have a real impact on everyone involved and we ask that you continue to fund them so we can all work together to continue this effort and build the workforce North Dakota needs going forward.

#5
3/9/15

March 9, 2015

Chairman Flakoll and members of the committee, my name is Mindy Grant de Herrera. I am from West Fargo. Today, I stand in favor of HB 1393.

I am a mother of four with 2 children in the West Fargo Public School District's STEM program.

The STEM program has given my children the skills they need to take control of their education and their future. They feel they have an active part to play in their own learning process because of the educational style specific to the STEM program. It is not what is taught but how it is taught that has made the difference.

Since my oldest daughter's entrance in the program in 2010, we have watched the STEM program struggle. The students in the STEM program are overwhelmingly excited and involved. Many of them volunteer their personal time to promote STEM in our community at large and especially among younger grades. However, our district lacks the ability and funding to provide all the opportunities that our STEM students are demanding.

I have seen my children's mind awakened. I have seen their peer's minds awakened. These students are taking on the responsibility of educating themselves and being active participants in their futures. STEM has given them focus, drive, and a process to effect change in their communities.

In 2013 at age 13, my daughter put together a panel presentation for the SXSW Edu conference in Austin, TX entitled "Don't make me go back to traditional education". Where, in a national forum, she spoke about the changes STEM had initiated in her and how she could never be satisfied in a regular classroom setting again.

There is a very bright future on the horizon filled with dedicated youth. Our schools need the funding and support of the legislature to continue cultivating the relationships necessary to provide these opportunities in the future.

Please don't let this opportunity pass us by. I urge your "do pass" recommendation on this bill. Thank you and I will stand for any questions.

Mindy Grant de Herrera
District 13

1/1

#6
3/9/15
HB 1393

Chairman Flakoll, Vice Chairman Rust, Legislative Members, for the record, I am David DeMuth, Jr., Professor of Physics at Valley City State University, a strong proponent for addressing the high tech workforce needs of North Dakota through an orchestrated and sustained focus on STEM learning.

To the Great Plains STEM Education Center at VCSU, STEM learning is where the rubber hits the road, it is when 95 seventh grade Language Arts students at Liberty Middle School in West Fargo Middle School make computer games, and at Tech Savvy and STEMtastic Jamestown! events where 370 seventh and eighth graders spend a special day doing hands-on STEM, or in Fort Yates at the Standing Rock Reservation where 130 students do nanotechnology with their own hands on a Nano-Link day.

As a four year cohort, the North Dakota STEM Network is a fully spectrumed expert group of professionals working to ensure integrative STEM strategies are implemented in all of North Dakota K-12 schools. In doing so high school graduation rates, post-secondary school recruitment, retention and graduation rates increase above expectation.

A STEM Network facilitates and sustains a conversation on STEM learning, the kind of learning that our employers and our colleges want in our high school graduates!

In the two years that the 63rd Legislature afforded through House Bill 1228 which introduced the STEM Network, important progress was made to establish a statewide cohort of STEM enthusiasts. Please support HB 1393 to further this great work.

Thank you.

HB 1393

3-17-15

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Testimony in SUPPORT- HB 1393
Matthew Leiphon- North Dakota STEM Network

March 17, 2015

Chairman Holmberg, members of the committee,

My name is Matthew Leiphon, and I work with the management team of the North Dakota STEM Network. I am here today to testify in SUPPORT of passage of House Bill 1393. The funding provided by this bill will enable North Dakota's STEM stakeholders, from business, economic development and education, to continue to work to find new and innovative ways to prepare our state's students for careers in growing, science, technology, engineering, and math (STEM)-related industries.

The ND STEM Network works to connect and increase cooperation throughout the state in order to provide opportunities for students to be creative, innovative, and prepared for careers in STEM. The Network's leadership is committed to ensuring STEM education is responsive to real-world opportunities and needs, engaging business as a key partner. By ensuring industry has a seat at the table, the STEM Network helps provide educators with valuable guidance and access to resources from the private sector, helping our teachers better prepare students for STEM-related jobs with North Dakota companies.

North Dakota's rapidly growing and changing economy is causing increased demand for a STEM-ready workforce, with new and expanding industries creating job openings requiring strong STEM-skillsets. According to analysis conducted by the Network, North Dakota led the nation in growth of STEM jobs between 2004 and 2014, adding 37% to its STEM workforce of engineers, technicians, and scientists. Despite this growth, North Dakota remains towards the bottom for

concentration of such jobs. STEM jobs represented just 3.3% of all jobs in North Dakota in 2014, ranking just 44th among all the states. As North Dakota's economy grows, diversifies, and new industries emerge, it's projected that the state will need to fill 8000 new, highly-skilled STEM jobs by 2022. There is strong demand, but the state still trails others in STEM jobs. This shows the strong need to invest in initiatives to strengthen the state's STEM education system and to build ties to industry.

Providing North Dakota's young people with access to top-quality STEM education opens the door to great careers. STEM jobs tend to be high-paying. According to analysis conducted by the Network, the median hourly pay for all STEM jobs in North Dakota in 2014 was nearly \$28 per hour. That's nearly \$10 per hour more than the overall median pay of \$18.50. Professions requiring four year and advanced degrees, such as engineers and physical scientists, are some of the highest paid positions, but technician-level occupation groups also offer great pay, opening opportunities for students who choose other educational paths.

Making sure our students are well-prepared for these cutting-edge careers will require coordination of efforts between our state's educators and business leaders. The best way to meet our workforce needs and create economic opportunity for our citizens is to develop a pipeline of talent from within. By working together, the state can "punch above its weight" in building a strong, career-ready workforce. Building partnerships will take resources, however, which is why funds provided by House Bill 1393 are so important.

Today, teachers, educators, and STEM practitioners are active in pockets throughout the state, rolling out innovative programming designed to prepare students for the STEM economy. With so many different activities and entities operating independently around the

state, there is a degree of fragmentation of efforts. The STEM Network's goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that connect and coordinate private and public sector STEM projects.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a focus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network is in the process of building a foundation for something that has taken years and decades to build up in other states. The efforts to add structure to the network over the past year are supporting teachers in their ongoing delivery of STEM education, strengthening existing connections between business and educators.

Building these connections can't be the responsibility of the state alone. Creating a strong network will require investment and commitment from the private and public sectors. Over the past year, we've met and worked with multiple businesses throughout the state. We've also hosted regional meetings bringing together educators, policymakers, economic developers, and business leaders to discuss ways to work together. Companies including Bobcat, KLJ, Northrop Grumman, Ackerman Estvold, and Microsoft have kindly hosted or participated in these events, providing an opportunity for collaboration and engagement.

In addition to hosting regional events, the Network has been involved in several other activities to build STEM business-to-education partnerships:

- Hosting a statewide conference with the support of industry and other sponsors attended by close to 150 educators, business leaders, economic developers, and industry representatives;
- Performing one-on-one outreach meetings with employers to gather information and advocate for industry support of STEM initiatives and advancement of STEM workforce development, and;
- Producing economic, workforce, and data analysis reports by industry and occupation to provide stakeholders and policymakers with valuable information on STEM workforce needs and trends.

Over the next two years, the STEM Network will continue to build on these efforts to build industry-education exchanges, working with business to host meetings, gather input, build connections with educators, and create new partnership opportunities.

The Network plans to continue to actively pursue outside resources to supplement the state's investment. The Network has founded a nonprofit organization, and is in the process of seeking federal 501c3 status in order to better position the initiative to pursue outside resources. Our goal is to use industry support as a model for long-term sustainability, supported by grant funding, donations, and other private sources of support and funding.

By passing HB 1393, North Dakota will be investing in stronger industry-education ties, highlighting the work of innovative STEM educators, and pursuing expanded industry and grant funding and support. The Network is a connection between the state's already active education and economic development activities. By working together, this public-private partnership can build a foundation for strong careers for our state's citizens and a strong economic future for our state.

AB 1393
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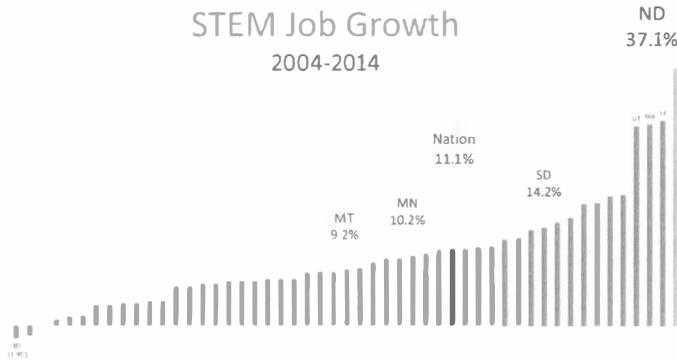
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The State of STEM in 2014 and ND STEM Network Profile

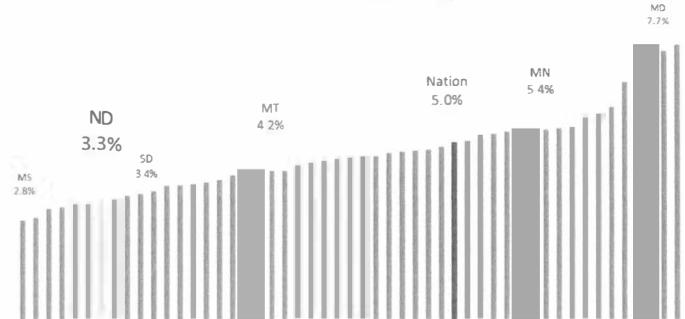
January, 2015

North Dakota led the nation in growth of STEM jobs between 2004 and 2014 adding 37.1% to its STEM workforce of engineers, technicians, and scientists. Yet STEM jobs represent just 3.3% of all jobs in North Dakota, ranking 44th among all states. Despite this growth, North Dakota remains towards the bottom for concentration of STEM jobs. It is estimated that the state will need to fill 15,000 highly-skilled STEM jobs by 2018.

STEM Job Growth
2004-2014



STEM Job Concentration, 2014



The state's largest STEM job category is computer-related occupations, totaling 6,800 jobs. There are nearly 4,000 engineers in the state and another 2,500 works in technician-level engineering jobs typically requiring 2-years of training. Largely driven by the expanding energy economy over the past five years, engineers, engineering technicians, and physical scientist are the fastest growing STEM job categories, each over 40% since 2009. Overall, STEM jobs are up 19% since 2009.

ND STEM Jobs

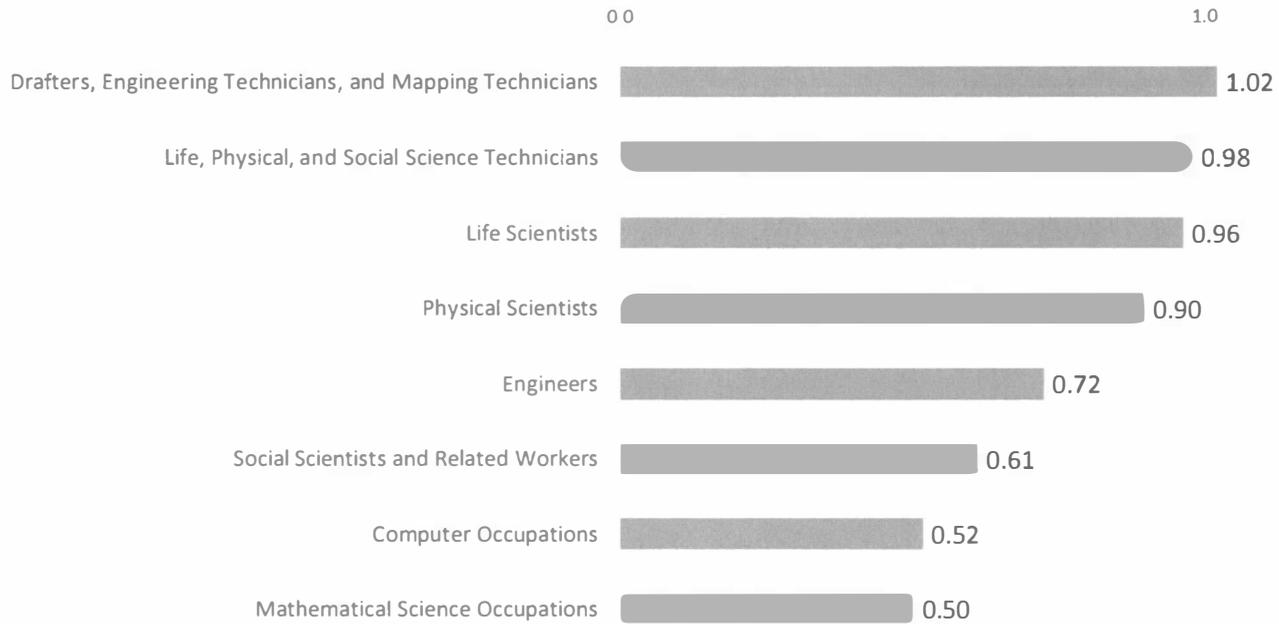
Description	2014 Jobs	2009 - 2014 % Change
Computer Occupations	6,788	6%
Engineers	3,989	41%
Drafters, Engineering Technicians, and Mapping Technicians	2,452	46%
Life, Physical, and Social Science Technicians	1,184	23%
Life Scientists	959	2%
Physical Scientists	889	46%
Social Scientists and Related Workers	630	(3%)
Mathematical Science Occupations	227	4%
Total	17,117	19%

Even after the recent growth, just one of the eight major STEM job categories holds an above-average concentration in the state in 2014: life and physical science technicians. The following chart shows the ration of the local share of total jobs in each STEM category in North Dakota divided by the national share of jobs in the same category. The ratio for life and physical science technicians is 1.02, indicating that the concentration in North Dakota is just 2% above average. National average concentration is 1.0.

2.1

The state lags the national average in all other occupation categories, but most acutely in social scientists, computer occupations (even though this is the largest of the eight groups) and mathematics jobs. The state is rapidly adding engineering jobs, yet it remains 28% below national average in concentration of engineers.

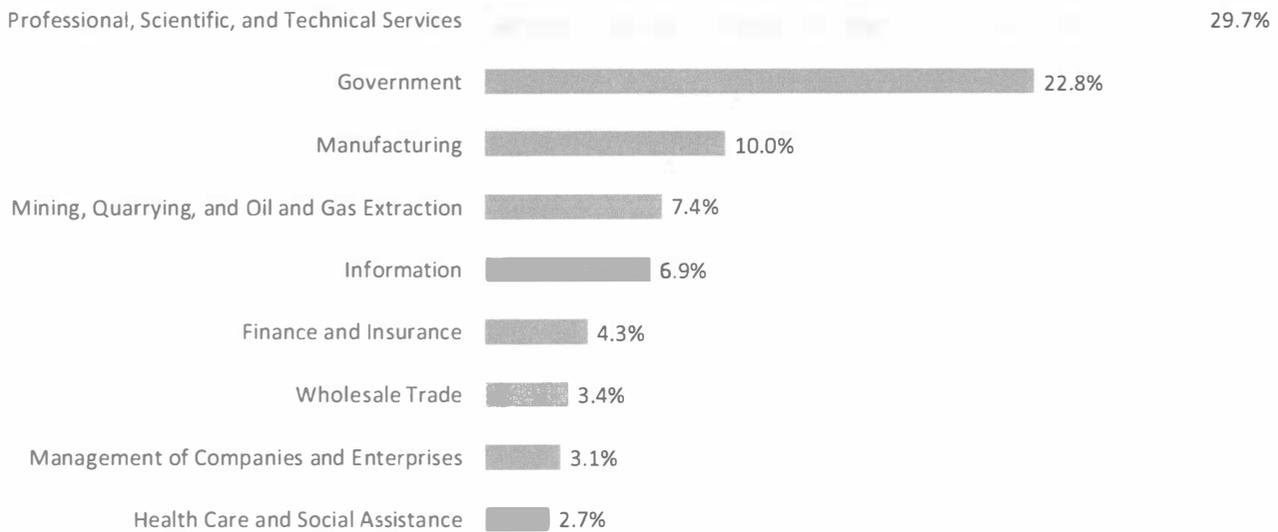
ND STEM Occupation Concentration, 2014



More than a quarter of all STEM workers in North Dakota are employed by professional, scientific, and technical services firms. These include high-end business-to-business services sectors such as engineering services and consulting. Another 22% of STEM workers are employed by local, state, and federal government agencies. Manufacturers account for another 11% and the mining and extraction sector another 9%.

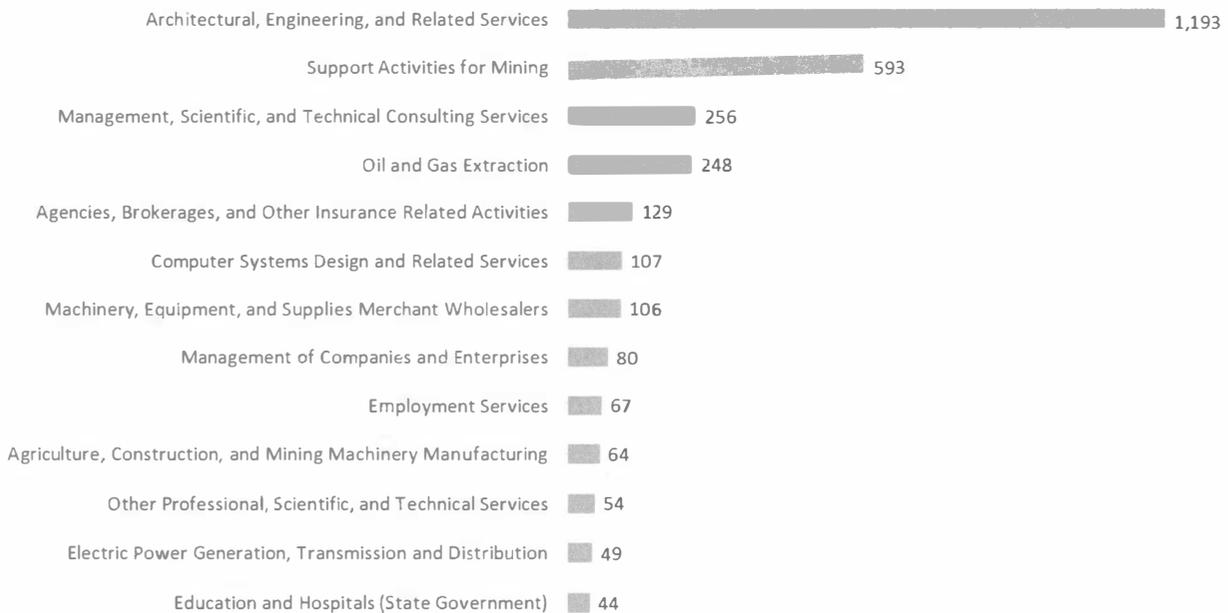
Where are the STEM jobs?

ND STEM Jobs by Industry, 2014



Drilling down in to particular industries and the number of new STEM jobs in each, architecture and engineering services firms led the way with nearly 1,200 new jobs in the past five years. The support activities for mining added another 600 and extraction another 250 STEM jobs.

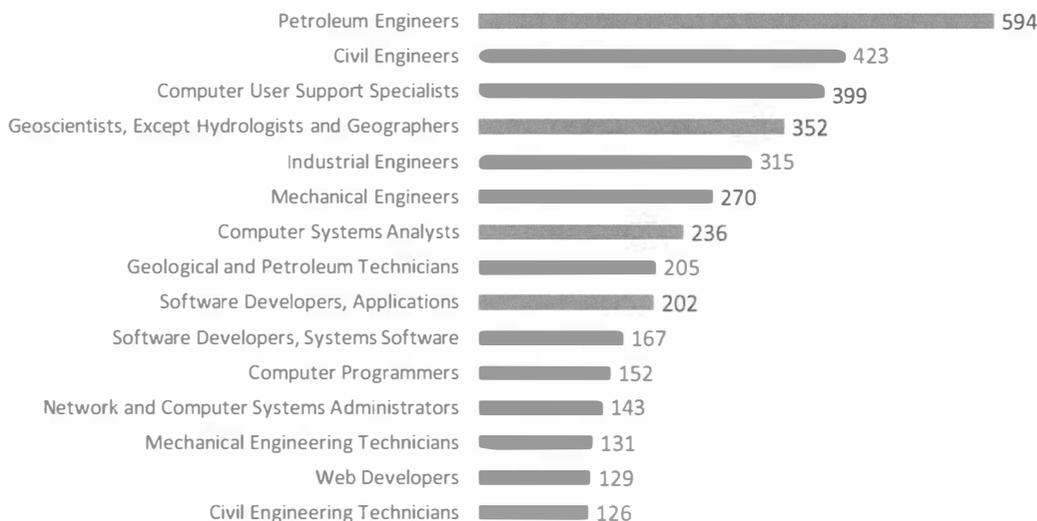
STEM Growth Industries, 2009-2014



Job growth is one major driver for labor force demand, but retirements and general job churn also are a source of job openings. The following chart lists overall openings for STEM occupations since 2010 and projected to 2015. The effect of the energy boom is apparent with the need for nearly 600 new petroleum engineers and many more civil engineers,

geoscientists, industrial, and mechanical engineers. Other active occupations include computer and information technology-related jobs, a good sign as this sector is currently underdeveloped in North Dakota.

STEM Openings, 2010-2015



Adjusting degree production for the size of the state, North Dakota is one of the nation’s most significant talent producers. The following table lists the state’s degree production for the state’s largest STEM-related degree programs over the past decade. The right-hand column charts a trend line of degrees awarded for each program since 2003. The state is seeing rising production across many degree categories.

ND STEM Degree Production

Program	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Trend Line
Mechanical Engineering	136	154	140	153	146	139	137	136	148	136	196	
Electrical Engineering Technologies/Technicians	90	124	111	146	168	125	161	212	136	143	167	
Biology, General	129	119	122	145	150	163	136	141	178	161	159	
Clinical/Medical Laboratory Science/Research and Allied Professions	53	41	51	88	128	116	138	150	168	150	157	
Industrial Production Technologies/Technicians	119	131	135	135	114	134	170	212	213	163	140	
Civil Engineering	122	149	85	116	85	113	98	107	127	122	125	
Electrical, Electronics and Communications Engineering	95	83	110	102	98	106	108	104	97	114	116	
Management Information Systems and Services	135	157	119	82	75	73	81	90	156	106	107	
Zoology/Animal Biology	52	60	67	76	83	74	71	50	74	88	94	
Computer Science	9	65	74	64	49	66	64	77	75	92	84	
Computer and Information Sciences, General	229	159	129	116	86	86	89	110	84	71	69	
Mathematics	51	43	47	48	45	49	56	59	49	61	54	
Chemistry	53	52	51	29	55	53	50	39	54	61	50	
Microbiological Sciences and Immunology	23	18	36	29	20	19	25	27	32	38	49	
Computer Engineering	2	6	7	14	15	18	23	32	14	21	44	
Industrial Engineering	28	22	27	22	25	21	23	32	35	46	40	
Chemical Engineering	11	23	22	37	22	24	22	36	32	23	31	

STEM jobs tend to be high-paying. Median hourly pay for all STEM jobs in North Dakota in 2014 is \$27.90. Engineers are the highest-paying of the eight categories at \$35.11, followed by physical scientists and mathematicians. The technician-level occupation groups also offer good pay, with median pay for engineering technicians at \$22.38 and life and physical science technicians at \$19.04. However, there remains room for STEM job pay in North Dakota to increase. The

2.4

following table compares pay in the state to a baseline average of nine surrounding states. Pay for technicians in North Dakota is generally competitive, particularly life science technicians and entry level engineering techs. However pay lags in many other categories, marked most acutely by computer jobs where 10th percentile workers make 82% of the regional average and those in the 90th percentile just 74% of workers across the region.

ND Pay vs. 9 Upper Plains States, 2014

Description	Pct. 10 Hourly Earnings	Pct. 25 Hourly Earnings	Median Hourly Earnings	Pct. 75 Hourly Earnings	Pct. 90 Hourly Earnings
Computer Occupations	82%	80%	77%	76%	74%
Mathematical Science Occupations	85%	83%	78%	76%	83%
Engineers	88%	89%	88%	88%	89%
Drafters, Engineering Technicians, & Mapping Technicians	99%	94%	91%	91%	90%
Life Scientists	90%	90%	95%	92%	89%
Physical Scientists	105%	93%	86%	81%	76%
Social Scientists & Related Workers	88%	82%	87%	91%	90%
Life, Physical, & Social Science Technicians	98%	96%	98%	102%	100%
Total	87%	84%	82%	82%	80%

STEM NETWORK ACTIVITIES IN 2014

Teachers, educators, and STEM practitioners are active in pockets of the state. Discussions with North Dakota employers and the statistics suggest that we need to continue to elevate the delivery and prevalence of STEM education and activities throughout the state. An educated STEM workforce is important in creating a robust diversified economy. The best way to meet our workforce needs and to create opportunity for our citizens is to develop a pipeline of talent from within.

The STEM Grant funding provided during the last biennium has supported the development of the STEM Network as a nexus of STEM activity and support. An authentic network is based upon individual connections and relationships. The ND STEM Network is in the process of building a foundation for something that has taken years and decades to build in other states. The efforts to add structure to the network over the past 10 months are supporting teachers in their ongoing delivery of STEM education and strengthening existing and forging new connections with partners in industry.

The STEM Network has been established as an independent organization to leverage and enhance North Dakota's existing investments in K12 and higher education and in workforce and economic development. Over the last 12 months, the Network has been involved in several activities to support ongoing STEM education efforts and to build connections between the business and the education communities:

- **2014 STEM Summit** – attended by close to 150 educators, business leaders, economic developers, and industry representatives.
 - o Provided a venue for sharing of efforts between educators and employers
 - o STEM Professional Development workshops for educators
 - o Nationally renowned experts and leaders showcasing best practices and techniques for STEM education
 - o Forged connections between the state's top STEM teachers who are often isolated in their home school districts
- Hosted **Four Regional Network meetings** throughout the state
 - o Attended by educators, private business people, economic development professionals, and state lawmakers
 - o Showcase innovated STEM programs in each region

2,5

- Enlighten economic developers and industry as to what is going on in classrooms and afterschool activities and how they can engage and support in a meaningful way
- Disseminate current labor market information about state STEM job trends
- Incorporated the STEM Network as a ND non-profit and working towards federal 501c3 status
- Performed 1-on-1 outreach meetings with employers advocating for industry support of STEM initiatives and advancement of STEM workforce development
- Public support and communications efforts
 - Next Generation Science Standards white paper
 - Shared STEM news, grant and resource opportunities, and other information across the state
- Produced economic, workforce, and data analysis reports by industry and occupation for ND regions and statewide to get data in the hands of state policymakers. Information was delivered in written reports and in-person presentations. Topics in 2014 included North Dakota STEM Economy Report, ND Oil & Gas Extraction Employment Summary, Women in Construction Across the Great Plains, UAS Industry Analysis, Minot Economic and Workforce Analysis, and various Regional Analyses.

STEM NETWORK GOALS

There are many great STEM education activities and resources available in pockets across the state. Several districts host FIRST and Bison Best Robotics teams and other afterschool activities. Other districts are delivering STEM classroom curriculum like Project Lead the Way, classroom career development days like “You’re Hired”, professional development workshops delivered by universities in the state and a host of other activities. The innovative Teachers in Industry program is placing teachers in a business for one month each summer.

With so many different activities and entities operating independently around the state, there is a degree of fragmentation of efforts in silos of activity. North Dakota is a small state, but it can use its size to its benefit by focusing on collaboration and sharing of ideas.

The STEM Network’s goal is to serve as a central hub and clearing house of information, a connector of resources to programs, and a platform of services that coordinate private and public sector resources and make them easier to access. We hope to:

- ⇒ Grow the level of industry engagement with education and workforce training and create succinct linkages between educators and industry
- ⇒ Connect teachers with teachers to share curriculum and program ideas across the state
- ⇒ Use industry support as a model for ND STEM Network long-term sustainability, supported by grant funding, donations, and other private sources of support and funding
- ⇒ Eliminate or reduce the fragmentation of activities, duplication of efforts, and increase the efficiency of resources and investments
- ⇒ Improve access to STEM career information among parents, students, and guidance professionals
- ⇒ Improve access to labor market data to support curriculum design, workforce development policy, and talent recruitment
- ⇒ Align industry workforce needs and challenges with development of education activities
- ⇒ Enhance the experience of North Dakota K-12 students using STEM education principles such as problem-based learning, multidisciplinary curriculum, and hands-on experiences
- ⇒ Complement other ongoing state workforce and educational development programs, working in partnership to improve STEM awareness and better prepare North Dakota students for the workforce

STEM NETWORK ACTIVITIES 2015-2016

Working to achieve its goals, the ND STEM Network will engage in the following primary activities.

2.6

Create Industry-Education Exchanges to connect employers with educators. The Exchange format insures that industry is represented and connected to elementary, high school, tech training, classroom activity, and afterschool activities and higher education STEM curriculum. The format provides educators with a chance to leverage connections with businesses to enhance student experiences and to increase business support of education programs. The Exchanges will comprise three main activities:

- Statewide industry roundtable meetings facilitating face-to-face discussions between STEM businesses, regional leaders, and educators.
- NDSTEMExchange.org – an online information source containing a STEM resource inventory organized by industry. The online tool will centralize information about existing STEM education, career development, and training activities already happening in the state. The site will aim to be a place where teachers can connect to business, teachers can find inspiring ideas from other teachers, and businesses can identify chances to work with educators in their region or industry.
- Interactive map of state STEM resources. This interactive map will allow parents, educators, industry partners, to locate STEM projects and resources in their region of the state. For instance an industry user may select a specific tab to find teachers interested in business mentorships.

2016 North Dakota STEM Summit. The STEM Summit is a statewide event that provides a face-to-face platform for our STEM community to connect. The event highlights the best STEM programs and practices happening in North Dakota, offers technical sessions for educators, and features exhibits and sessions about business-education connections.

STEM Economy Data for Decision Making. The ND STEM Network will continue to provide on-demand analysis of state trends and emerging job opportunities. The network will publish focused data reports and be available for in person presentations as needed by education and workforce leaders and policymakers.

Continue Regional STEM Network Meetings. The regional STEM Network meetings provide a chance to showcase what's happening in each region in more depth. Half-day regional meetings in 2014 were attended by K-12 teachers, higher education representatives, workforce and economic developers, chamber of commerce representatives, and many private businesses. These meetings showcase the STEM issues most important to each region and offer a chance to connect with new local partners outside of the STEM Summit. The STEM Network will coordinate two regional meetings in each region in the 2015-2017 biennium.

STEM Days for K-12 Students. Student engagement is critically important to ensure more high school graduates pursuing STEM professions. STEM Days are interactive events for 7th and 8th grade students to expose them to science and technology. The STEM Network will work with regional leaders to coordinate one event per year in each of the four ND STEM Network regions and one in partnership with the state's Native American Tribes. These events are modeled after the recent Tech Savvy and STEMtastic Jamestown! Events supported by the American Association of University Women and coordinated by the American Heart Association of Jamestown, the Jamestown/Stutsman Economic Development Corporation, the United State Geological Survey, the University of Jamestown, and the Great Plains STEM Education Center at Valley City State University, influencing over 360 7th and 8th grade students, and 18 teachers and paraprofessionals from those same grades.

Testimony on HB 1393
Senate Appropriations Committee
Department of Career and Technical Education
March 17, 2015

HB 1393
3-17-15
#3

Mr. Chairman and members of the Education Committee my name is Wayne Kutzer Director of the Department of Career and Technical Education. We support HB 1393 which provides \$100,000 to help implement and support STEM initiatives and activities.

The funding in this bill will enable us to continue the statewide STEM efforts in cooperation with the ND STEM Network. It specifically will continue to partially fund two annual STEM conferences for teachers and administrators and four to five new regional STEM Day activities each year for K-12 students. Our agency will provide administration and coordination for the STEM Network so they can continue their regional coordination activities as well as serve as a hub and clearinghouse of STEM information, helping to connect and coordinate resources across the state.

Last session, CTE, through a Senate resolution, was designated as the STEM agency in ND, to help direct and coordinate STEM efforts ...to provide support and guidance. When we were approached to house this bill and the funding, we did so because it fits that mission and helps to continue it.

Mr. Chairman and members of the committee, I support HB1393 and would be glad to answer any questions you might have.

STEM Funding Summary

EbD & PLTW

37 high schools, over 3200 students (Ashley, Bismarck, Central Valley, Cavalier, Cooperstown, Dickinson, Edmore, Ellendale, Fargo, Glenburn, Grand Forks, Jamestown, Linton, Mandan, Milnor, Minot, New Rockford, Hatton/Northwood, Pembina, Richardton-Taylor, Steele, Thompson, Valley City, Lisbon, West Fargo, Williston and Wimbledon)

Devils Lake requested CTE funding for PLTW programs for this year at the middle and high school, started PLTW in all 3 elementary schools this year

Wahpeton requested CTE funding for PLTW programs for this year at the middle and high school

West Fargo started PLTW in their elementary schools; they already have PLTW in the secondary schools

Minot Central Campus changed all of their classes to implement EbD Curriculum throughout

Mandan High Schools changed all of their classes to implement EbD Curriculum throughout

STEM Matching Grants

Bismarck Public Schools expanded the use of STEM Robotics this year into the 6th grade - 1850 students - Business Partner is Bobcat

Williston Public Schools offered three new section of EbD curriculum this year – 50 students - Business Partners are SM Energy, ASK Transportation, Inc. and Vestal Properties, LLC

West Fargo Middle Schools conducted STEM Cybermission and coding pipeline, 3D printing integration and STEM SEPUP into their middle school curriculum - 1858 students - Business partners are Century Link and Verizon Corporation

Wahpeton Public School started PLTW Gateway and PLTW Pathway to Engineering in the middle and high schools this year – 220 students – Business Partners are Cargill and ComDel Innovations

Alexander Public School incorporated PLTW Launch into their fourth, fifth and sixth grades this year – 60 students – Business Partner is QEP Resources

Edwin Loe Elementary in New Town incorporated PLTW Launch into their fifth grade this year – 65 students – Business Partner is QEP Resources

McKenzie County Public School incorporated PLTW Launch into their fifth grade this year – 88 students – Business Partner is QEP Resources

Grand Forks Public Schools will be expanding PLTW Gateway into their sixth and seventh grades next year – 976 students – Business Partner is Northrup Grumman Corporation

Other Projects

NDSCS is offering a pilot class in Biomedical Technology through the virtual center in Grand Forks. The pilot group has students from grades 10-12 so they can determine age appropriateness. The course is being delivered online and the labs will be delivered face-to-face. We hope to grow the course into a program. The course is being developed as part of STEM Infusion.

House Education Committee
Testimony on Senate Bill 1393
March 17, 2015

HB 1393
3-17-15
#4

Mr. Chairman and members of the committee, my name is Paul Keidel, Vice Chairman of the ND STEM Network and STEM Coordinator of the Missouri River Education Cooperative. We are in support of SB 1393.

The ND STEM Network aims to link and increase cooperation among all North Dakota stakeholders to provide opportunities and encourage all students to be creative and innovative, gaining 21st century skills through increased engagement in project-based learning and problem solving, driven by the science, technology, engineering and mathematics (STEM) disciplines. These skills will allow more North Dakotans to graduate, gain additional skills and become part of a productive and competitive workforce in North Dakota. We believe this approach to education needs to become our vision for North Dakota students and is the responsibility, not only of institutions at all levels, but is the responsibility of all North Dakota citizens, businesses and communities.

Currently the ND STEM Network has divided into 4 Regions. (NW, SW, NE and SE) All regions have gathered in their local communities and have started the organization of STEM communities that are preparing to take on the duties the Network set out to do after the last ND legislative session. Regional meetings have been held at Microsoft, Bobcat/Doosan, Bismarck State College, North Dakota State University, Minot State University, Bismarck Career Academy, Fargo Public Schools, Dakota College at Bottineau and the University of North Dakota.

Because of the Network, new programs have been growing around the state. Examples include: The NDSU Teacher in Industry Program, the FIRST Tech Robotics Challenge and STEM Fairs. The North Dakota STEM Network produced a position statement in favor of the adoption of the Next Generation of Science Standards and held a ND STEM Summit (Professional Development Conference) along with North Dakota REAs, the Council on the Arts, the North Dakota Career and Technology Education Department and North Dakota Math/Science Partnerships.

Chairman and members of the committee, thank you for your time today. May I answer any questions for you?

4.1

HB 1393

In Support

Rebecca Engelman

Arts in Education Director ND Council on the Arts

HB 1393
3-17-15
#5

Chairman Holmberg, Members of the Committee,

My name is Rebecca Engelman and I am the Arts in Education Director for ND Council on the Arts. I currently serve on the board of directors for the ND STEM Network.

I am here today to testify in favor of bill HB 1393 concerning funding for the ND STEM Network.

The complex problems we face with our changing state economy demands an increasingly STEM literate citizenry to make informed decisions. In recent years, waning student interest and performance in the fields of science, technology, engineering, and mathematics (STEM) has been of great national concern. Statistics demonstrate the magnitude of this problem:

- Only thirty-five percent of the nation's eighth graders perform at or above proficient in mathematics (2011, The National Assessment of Educational Progress).
- Thirty-two percent of the nation's eighth graders perform at or above proficient in science (2011 NAEP).
- And less than half (45%) of high school graduates in 2011 were prepared for college math and less than a third (30%) were prepared for college science

The alarm has been sounded - and we have responded.

Teachers and schools across the state have been beefing up their STEM programs in order to give students a solid foundation in subjects that are critical to their personal and professional success.

Steps are being made to strengthen math and science standards, create new courses, write new curricula, integrate new technologies, and design STEM-related programs and resources.

But in order for these efforts to take hold and grow we need to provide teachers with access to resources, support, and peer-to-peer professional development.

We need to provide space that allows individuals from all areas of the curriculum; language arts, social studies, science, math, technology, and the arts to feel connected and empowered. For in the end this is not really just about Science, technology, engineering, and Math but rather about strategies that engage minds.

The ND STEM Network, a community of educators, institutes of higher ed, state and local government agencies, business, industry, regional education cooperatives, and various non-profits provides this space.

The STEM Network is structured for collaboration, resource sharing, and for the nurturing of collegial relationships.

The STEM Network is a hub that connects educators from various schools, districts, grade levels and areas of the curriculum who understand that critical thinking, communication, creativity, and collaboration are at the heart of good teaching and learning.

The STEM Network connects educators to industry, and industry to education.

This is a critical time for education in ND. The challenging work for our educators requires an effective backbone of support. As the STEM Network begins to take root and provide that support, it is imperative to ensure that it has the resources it needs for continued growth.

Chairman Holmberg, and members of the Committee, as you make budgetary decisions concerning bill 1393, I ask that you keep in mind the foundation that has been laid, connections that have been made, and team work that is currently taking place within the STEM Network. At a time when the STEM Network is beginning to get traction and pick up steam, your support is critical to advancing STEM education in ND.

Thank you for listening to my testimony. At this time I would happy to respond to any questions you might have.