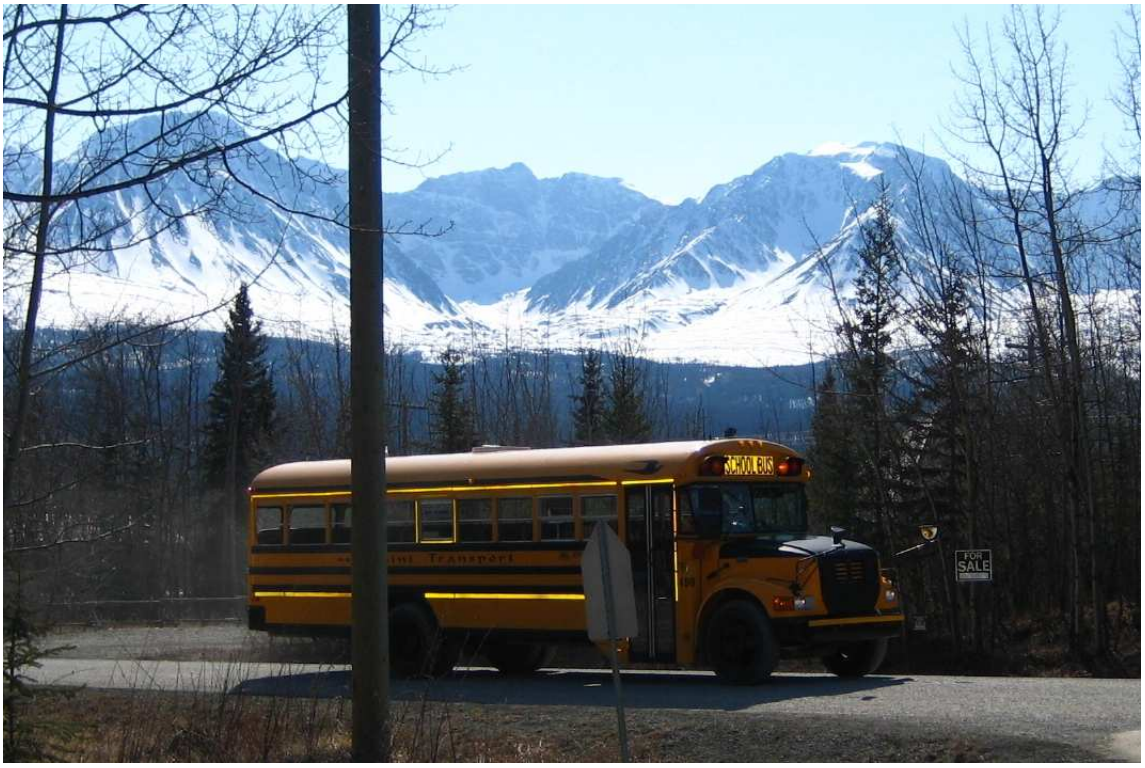
Sustainability, Science and Engineering North of 60°

April 22nd–25th 2008



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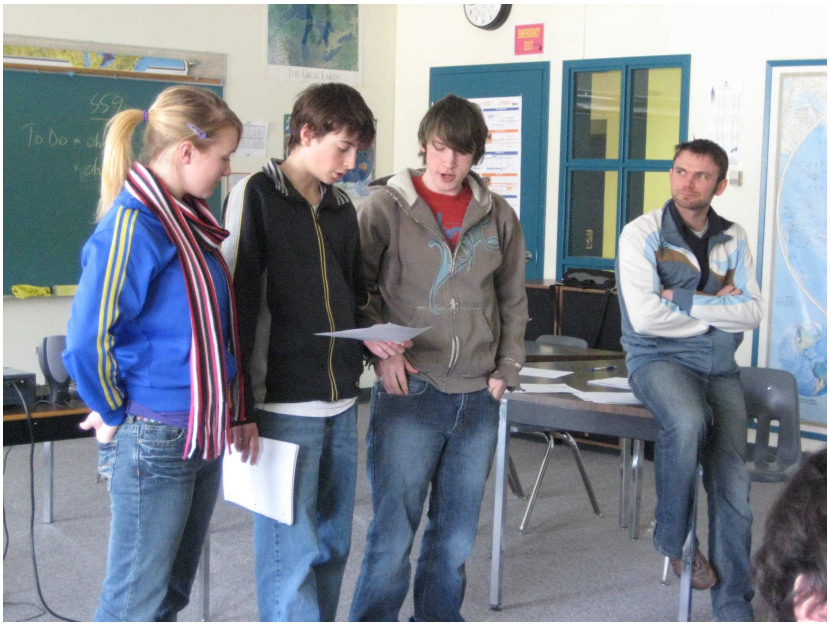
I. Summary of Trip

We prepared and presented four types of engineering outreach presentations to high school students in the Yukon during the week of April 22nd – April 25th, 2008. The four presentations were: 1.) An introduction to Engineering with discussion 2.) Hands on Egg Mining Activity 3.) Sustainable High School Project Presentation with discussion and mini-presentations and 4.) Water Quality Role Playing Activity. The presentation for each class depended on the teacher's preference, grade level and number of students. We reached students in Whitehorse, Dawson City, and Haines Junction. We met with approximately 120 students in 5 different schools in the aforementioned cities. It was a very positive trip, as we felt the students learned a lot about engineering and sustainability. We also conducted a survey but are still waiting for some responses. The survey included questions about the presentation and about gender, ethnicity and whether these two concepts affected their desire to go into engineering.

II. Pictures

Alex facilitating a student presentation from the High School Sustainability Project Presentation



Student from Dawson City doing the Egg Mining Hands on Activity

Jill in front of St. Elias School in Haines Junction

III. Details of Trip

Day	Grade	City	School	Contact	Teacher	# of Students	Activity
Monday	9	Dawson City	Robert Service Community School	Liz Woods, liz.woods@yesnet.yk.ca, (867) 993-5435	Bob Sutherland	9	Egg Mining
Monday	12	Dawson City	Robert Service Community School	Liz Woods	Bob Sutherland	12	Introduction to Engineering, High School Sustainability Project
Tuesday	-	Whitehorse	Integrated Learning Centre	Carolyn Coombs Carolyn.coombs@yesnet.yk.ca 867-667-8288		2	High School Sustainability Project
Wednesday	9	Whitehorse	Vanier Catholic Secondary School	Maura Sullivan, maura.sullivan@yesnet.yk.ca, (867) 667-5901	Maura Sullivan	25	Introduction to Engineering, Egg Mining
Wednesday	9	Whitehorse	Vanier Catholic Secondary School	Maura Sullivan	Maura Sullivan	25	Introduction to Engineering, Egg Mining
Wednesday	11	Whitehorse	Vanier Catholic Secondary School	Maura Sullivan	Maura Sullivan	30	Introduction to Engineering, HS Sustainability Project, Water Quality Role Play
Wednesday		Whitehorse	Department of Education	Debbie Gohl, Debbie.Gohl@gov.yk.ca, (867) 667-5679	Jim Boyde, Jim.Boyde@gov.yk.ca, (867) 667-8564		
Thursday	9	Haines Junction	St. Elias Community School	Dave McInnes, david.mcinnes@yesnet.yk.ca, (867) 634-2231	Dave McInnes	10	Introduction to Engineering, High School Sustinability Project
Friday	10	Whitehorse	Porter Creek Secondary	Andre Comeau, Andre.Comeau@yesnet.yk.ca	Andre Comeau	11	Introduction to Engineering, Egg Mining
Friday		Whitehorse	Yukon College	Arlin McFarlane, amcfarlane@yukoncollege.yk.ca			
Friday		Whitehorse	Energy Solutions Centre	Doug MacLean, doug.maclean@gov.yk.ca, (867) 393-7068	Shane Andre Msc Shane.andre@gov.yk.ca		

IV Description of classroom activities:

1.) Introduction to Engineering: In this presentation we introduced ourselves and discussed with the students about engineering. We complimented with discussion with pictures of different engineering disciplines. We included facts about women in engineering and famous engineers, both in a Canadian specific context. Additionally we presented applications of engineering in the Yukon and talked about why engineering is important to them. Also, we provided information about the education required to become an engineer.

2.) Egg Mining Activity: In this activity a hard boiled egg was used to simulate the earth. Students were given a tooth pick as a mining tool and it was their challenge to remove as much yoke (gold) as possible with as little damage to the egg white (tailings) and egg shell (earth's crust) as possible. Value was assigned to the mass of the yoke, white and egg shell removed and the students had to calculate if they made profit or not. The amount of the egg white and shell removed and time to perform the mining operation were expenses and the amount of egg yoke removed represented revenues. After weighing their materials and calculating their profits (some were negative), we discussed the importance of economics in mining operations and other engineering operations in general. We expanded the discussion to include the importance of the environment and social impacts as well. This provided a basic introduction to sustainable development for the students.

3.) Sustainable High School Project: We introduced this program made by youth for youth. This program proposed a method to address sustainability in high schools. Students, staff and teachers are invited to get together to assess how sustainable their school is. The project proposed a series of 20 indicators, varying from material and energy consumption, to health, food and good governance. Many high shools in BC are undertaking this project and are currently regrouped in a network. We hope that some high schools in the Yukon will join the program in a near future.

4.) Role Playing Activity: Public Water
The role playing activity goals were to introduce the students to many concepts about potable water: how is it treated, how is it distributed, the cost, and some aspect of the debate public good vs private interest. Students were encouraged to take play a role varying from CEO of a multinational company, to city engineer and community members.

V Description of non-classroom activities:

We met with Debbie Gohl and Jim Boyde of the Yukon Department of Education. We presented the HS sustainability project to them and discussed ideas for incorporating this project into high schools in the Yukon.

In addition we spoke with Doug Maclean and Shane Andre of the Energy Solutions Centre in Whitehorse. We also presented the sustainability project to them and discussed ways that their centre could help students get energy information for their high school sustainability assessment.

We also met with an instructor at the Yukon college, Arlin McFarlane and discussed possible application of the sustainability project at the college level.

VI Survey

a. Purpose of Survey

We developed a small survey to get feedback on our presentations for our own use (so we could adapt the presentation for the next class) and for future students who would like to continue this type of outreach. In addition we wanted to investigate gender issues associated with studying engineering in the future.

b. Survey Handout given to students at the end of the presentation:

Science, Engineering and Sustainability North of 60^{o} Student Survey

What did you like best about the presentation?_____

Why?_____

What did you NOT like about the presentation?_____

Why?_____

How can we improve our presentation?_____

Gender (circle one): Male / Female Ethnicity: Caucasian / Asian / FN / Other _____

Are you hesitant to study science or engineering because of your gender? (circle one) Yes/No/Maybe

Are you hesitant to study science or engineering because of your ethnicity? (circle one) Yes/No/Maybe

c. Survey Responses:

The total number of surveys collected so far was 20. Here is the ethnicity and gender breakdown:

10 females

10 males

Caucasian		Asian		First Nations		Other		Total	
Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
4	5	0	1	4	3	2	1	10	10

What did you like best about the presentation? Why?

Female Responses:
The activity – it was kinda fun.
Dissecting the egg and the few pictures – its fun and pictures show what each job does.
The egg – because it was hands on.
The hands on – because it gave a better understanding and fun!
Interactive – because it was fun.
Dividing into groups and doing presentations – because it was good to know how to do things and feel included.
When you guys had the movie clip and narrowed down the different types of engineers – because I learned a lot more and it was interesting.
I liked learning new ways on how to keep our environment sustainable – because I want a good place for my kids + grandkids.
The group assessment – it was fun and you were allowed to say your opinions.
Learning about different kinds of engineers – because some of it surprised me.

Male Responses:
Learning about engineering – because I learned future options.
It was cool learning about the environment and what jobs we can look into to improve it.
The hands on activity – because it was fun and informative.
I liked the movie clip – because it showed how responsible kids can be.
The brain storm and a little snack – because we get to do a little hands on and I was hungry.
Activity – it was fun and it was hands on.
They had a lot of knowledge about the field of engineering – it answered some of the questions that I have had for a while.
Candy, visual, hands on activity, local content – made things very interactive.
The experiment – I like hands on experience.
That it was very straight forward and interactive – because that the way presentations are supposed to be.

What did you NOT like about the presentation? Why?

Female Responses:
The slides could have been more colour/more interesting visually – because that could keep focus better.
Nothing – because it was fun.
Nothing – it was genius!! Hehe lots of fun.
I liked everything about the presentation – because it was just fun and you learned a lot.
Nothing –
Nothing really.
During hands on too quiet – explanation during activity would've helped.
Everything was good .
Lack of pictures – more shows more about the job.
The slide show – I don't know.

Male Responses:
Nothing
Nothing
Nothing
Nothing
Nothing
Nothing – Because it was fun.
I liked everything.
n/a
nothing.
the student presentation – I had poor prep.

How can we improve our presentation?

Female Responses:
Have more pictures.
More slides on the show.
More project variety.
You can add a game or give more activities to students.
More interaction and group work.
More interesting slides.

Male Reponses:
It's all good.
More activities.
I don't know.
Have a game and give more snacks.
More slides.
More candy, just joking.
I liked it the way it was.
Seems great already.

We had two questions that asked if the students were hesitant to study science or engineering because of either their gender or the ethnicity. The answer for all of the students to both questions were NO. We got no other responses.

d. Conclusions from the survey

There were several positive responses about the hands on egg mining activity. This probably because for this presentation it was almost completely hands on. We usually tied the introduction to engineering with this activity and after sitting to a presentation for 15 minutes, they were happy to have an activity rather than just listen to more presentations. During the egg mining activity, we would walk around and work with the students, ask them questions, and help them fill out a little calculations worksheet. We would conclude the egg mining activity with a small introduction discussion to sustainable development in engineering. We would emphasize the environmental, social and economic

impacts of “egg mining” and mining in the real world. We would suggest doing this hands-on activity again for any engineering students interested in doing outreach.

We also got good responses from the HS sustainably project presentation. They liked the brain storming and breaking into smaller groups, and then the small presentations we had them do in front of the class. This activity was very interactive. Like the egg mining it was tied with a power point presentation, which the students liked as well. They even specifically commented on a video clip that was in the presentation.

We also got some deeper responses than just comments about the activity. Some students said things like, they “learned a lot”, it was “cool to learn about the environment and jobs we can look into to improve it”, and “I liked learning new ways on how to keep our environment sustainable – because I want a good place for my kids + grandkids”. This shows we reached some of the students on a deeper level than it just being a fun activity led by a guest speaker.

Most of the responses to the second question were also positive. Either the students had little to criticize, or their criticism could be easily addressed. Getting this feedback though is incredible important because if you only have positive feedback it is often difficult to improve your presentation. Things that the students did not like about the presentation were the visuals. Either there were too many slides, or not enough color, or not enough pictures. Revising the power point presentations is something that could be done before future presentations.

For the improvement questions there were two responses about having a game. None of the presentations had a game incorporated into them, so this is something that could be looked into for future visits.

Overall, from these surveys, the presentation was a positive experience for the students.

e. Problems with the survey

We often ran out of time at the end of the class and could not hand out the survey. One teacher said she would have the students fill out the survey and return it to us, but we never got a response. It’s important to keep the survey short though, so that you only have to use the last 5 minutes (MAX) of the class to get feedback.

f. Recommendations for future surveys:

- Try and do the survey for each class. We saw almost 120 students but only collected 20 surveys. Having information from a larger population will give more sound conclusions.
- Add a question about grade level. There might be a greater trend in answers based on grade level rather than just asking about gender and ethnicity.
- Add a question about if they want to continue at college or university (general, not for science or engineering).
- Add a question asking them if they would consider going into engineering now that they’ve seen the presentation.

VII Budget:

Here is a summary of our expenses for the trip

Categories	Details	Costs
Transportation	Flights, Car rental, gasoline and Taxi	$ 2,307.37
Supplies for presentations	Eggs, scale, candy	$ 110.14
Food		$ 308.32
Accommodation	B&B	$ 320.00
Communication	may varies, one phone bill is still pending	$ 5.00
	total	$ 3,050.83
	travel money advance	$(3,700.00)
	amount due	$ (649.17)