STAR NETWORK OUTREACH

A partnership with Educators in Nunavut

Bob Hodgson¹, Sarah Wade², Teresa Fisico¹, John Hanesiak¹

¹University of Manitoba, STAR Network

²Nunavut Department of Education, Curriculum Writer

OUTLINE

Purpose

Examine the history and future of STAR Outreach

Who - looks at the importance of a target audience

When - looks at schedules and timelines for planning and delivery of an outreach program

What - looks at the content or product of outreach
- FOCUS: APPROACHES AND PRODUCTS

How - looks at ways in which to accomplish outreach goals within the structure of a research network

WHO - WHO CARES?

"STAR aims to improve understanding and prediction of severe arctic storms..." ...who cares about this improvement? Answer : the people who live there

... and if the improvement has not yet been accomplished? Answer: Increase awareness of the need for improvement

... and who, would want improved awareness of this issue? Answer: EDUCATORS and STUDENTS!





Get to Know your audience

Target Audience = Students ... does this idea have support

Possible choices

High School (e.g. grade 12)

- 250-750 students per year
- one unit, Weather and Climate
- One course, Grade 10 Science
 (Pan-Canadian Curriculum)

College (e.g. ETP Nunavut College)

- ~30 students per year
- one unit, 2-3 weeks
- One course, Environmental Technical Program (ETP)

BUT – discovered a Nunavut specific program under development focused on Atmosphere (potential for >40% related content!) ... SILA ...

Curriculum in Nunavut

• curriculum focused on local and traditional uses of the environment

- Nuna (Land, Grade 10)
- Tariaq (Water/Ocean, Grade 11)
- Sila (Atmosphere, Grade 12)

built around guiding
 Principles of Inuit
 Qaujimajatuqangit (IQ)

 concepts introduced via
 Experiences (students, family or community elders)



Curriculum Unit Icons used to divide learning content based on traditional concepts of knowledge, sharing, and learning

• science concepts linked to an aspects of local or traditional knowledge

WHEN - Schedules and Timelines

STAR wants to produce content... ...and SILA needs content...

STAR Outreach program - funding, 12-18 months
Curriculum development (~3-5 yrs) many people (writers, teachers, administrators etc.)
So, these two complimentary groups have difficulty arranging schedules and timelines...
STAR & SILA - we're MAKING it work
... not easy or ideal...
but both sides believe it's worth it!

Match made in heaven

• STAR's contribution complete by Aug. 30, 2010

• SILA's curriculum writers complete full course content - tested in schools in 2011

WHAT TO PRODUCE

... we have an audience and schedule ... Should content be driven by research? Answer: research results not ready for outreach - it's too high a level for the audience, - it may not directly match with audience Should content be driven by the Audience? Answer: If produced for specific requirements is more likely to be used, - content does not = research results (e.g. those published in Scientific literature) ... products must be specific to requirements,

but still related to the research goals ...

CONTENT SCOPE

content should meet the following criticia:
 - Fall within the scope and goals of STAR
 (i.e. understanding of Arctic weather and climate extremes)
SILA content requires:

- Relate to processes in the atmosphere,

- clear linkages to northerners/way of life

Overlap???

Answer: req. understanding of user needs (i.e. curricula),

- STAR can not produce material without direct input from users (SILA)

Solution: close working relationship (e.g. workshops, meetings, continuous collaboration)

SILA UNIT TEMPLATE

5

ij

<u>ħ</u>

... Understand that curriculum is a document and materials provided to the teachers... they use and modify for the classroom

So what to expect... package includes...

Learning Competencies Materials Language Development Background Opener Connector Activity Reflection Follow up Activity Classroom Reinforcement Accommodating Diversity Assessment

STAR and SILA Content

15 units Contributed by STAR:

Weather Watching

INGLUDES A WEATHER STATION E

- Patterns in Local Weather
- Weather While Traveling on the Land
- Where the Weather Comes From
- Reading Weather Maps
- Forecasting
- Aviation Weather
- What is Extreme Weather
- Blizzards
- Global Weather Extremes
- Global Energy
- Global Climate Processes
- Sea Ice and Weather
- Climate Change Primer
- Weather prediction in the face of Climate Change



Weather Watching

CARS Field Trip





Build and Instrument







Deflection Anemometer when the build deflects the doul to the angle equal to the reference circle, the height of the weight is recorded. The except can be moved up and down to adjust the centre of gravity and therefore deflection.

Patterns in Local Weather

EC Dataset 1 yr Complete* Dataset

Embedded formulas or instructions for students





Ľ	🛎 🔛 😒	1 🖨 🗋	. 🏹 🖌 🖡	i 🖪 •	•	N + 0		Σ -	Z Z		r59	~ ~	2.				-	Ψ.	BZ	Ū			\$ %	6 g 10	.0 .00 10 ÷.0	律 律	-		▲					
	Chart	2	•	fx																														
	A	В	С	D	E	F	G	Н	1	J	К	L	М	N	0	Р	Q	R	S	Т	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	
1		Lat	Long	Temp N	WC Mir	BH Mir 9	5P Mir \	/is Mir∖	Wind N E	P Mir A	λve. Τε	Ave RH A	ve Vis A	ve Wsp A	ve SF I	Max SF №	vlax W	Temp N	Temp \'	WC Va	RH Var	SP Var Vi	is Var	Wind V	DP Var 1	Temp (WC Cn F	RH Cnt ?	SP Cnt 1	Vis Cnt	Wind (OP Cnt		
2	Sanikilluac	56.54	-79.25	22.4	-2.5	99.7	103.7	24.1	28.3	13.4	-4.4	0.0	0.0	0.0	0.0	100.9	7.9	-4.4	0.0	25.0	65.0	6.0	4.0	11.0	0.0	-1253	-3644	24113	28852	5079	2895.5	-1918		
3	Arviat	61.1	-94.07	14.1	-1.0	100.0	103.7	15.0	54.5	12.9	-9.0	0.0	0.0	0.0	0.0	101.5	21.4	-9.0	11.0	83.0	65.0	1.0	9.0	173.0	34.0	-3298	-6703	28867	37033	4402.6	7817.4	-4379		
4	Bankin	62.82	-92.12	16.1	-3.0	99.5	103.5	24.8	59.5	12.4	-10.0	0.0	0.0	0.0	0.0	101.1	23.1	-10.0	13.0	87.0	51.0	3.0	6.0	223.0	42.0	-3633	-7223	28192	36914	6818.6	8446	-4830		
5	Kimmirut	62.85	-69.88	21.7	-2.3	98.7	102.9	24.1	18.5	9.9	-5.4	0.0	0.0	0.0	0.0	100.5	2.8	-5.4	0.0	4.0	20.0	20.0	1.0	0.0	0.0	-1361	-3001	18505	25123	5186.9	1005.6	-2400		
6	lqaluit	63.75	-68.55	20.5	-2.0	99.2	103.3	15.0	51.1	11.7	-8.7	0.0	0.0	0.0	0.0	100.8	16.4	-8.7	1.0	61.0	34.0	14.0	1.0	111.0	20.0	-3191	-5903	27576	36776	4700	5535.7	-4518		
7	Coral	64.19	-83.36	18.5	-2.3	100.0	103.3	24.1	35.7	12.1	-9.9	0.0	0.0	0.0	0.0	100.5	15.9	-9.9	5.0	74.0	55.0	32.0	2.0	107.0	32.0	-3615	-6800	28424	36683	7661.5	5815.5	-4801		
8	Dorset	64.23	-76.53	18.2	-2.0	100.0	103.3	15.0	48.5	11.2	-7.8	0.0	0.0	0.0	0.0	100.6	16.3	-7.8	0.0	16.0	59.0	25.0	0.0	105.0	1.0	-2829	-5494	28156	36707	4391.1	5967.3	-3704		
9	Baker	64.3	-96.08	16.0	-2.0	98.3	103.5	32.2	43.5	11.9	-10.7	0.0	0.0	0.0	0.0	101.4	17.6	-10.7	16.0	89.0	39.0	2.0	3.0	116.0	52.0	-3906	-7374	27503	36898	8703.1	5381.1	-5203		
10	Pangnirtug	66.15	-65.72	16.9	-1.0	93.5	102.6	0.0	28.9	8.3	-6.6	0.0	0.0	0.0	0.0	100.6	6.9	-6.6	1.0	14.0	4.0	21.0	0.0	12.0	19.0	-1805	-3318	19439	27557	0	2524.2	-3057		
11	Repulse	66.52	-86.22	16.5	-3.6	99.3	103.9	63.6	19.9	11.6	-11.1	0.0	0.0	0.0	0.0	101.1	7.2	-11.1	2.0	82.0	23.0	6.0	8.0	0.0	31.0	-3900	-6807	26946	35492	10577	2622.7	-5061		
12	Qikiqtarjua	67.55	-64.03	11.4	-2.3	100.0	103.7	0.0	34.3	5.9	-10.1	80.0 ‡	****	11.0	101.2	101.2	11.0	-10.1	0.0	30.0	52.0	7.0	0.0	32.0	4.0	-3692	-5732	29203	36932	0	4024.5	-4737		
13	Kugluktuk	67.82	-115.14	16.6	-2.0	97.9	104.3	24.1	38.5	12.7	-10.0	0.0	0.0	0.0	0.0	101.5	13.6	-10.0	8.0	76.0	31.0	6.0	0.0	70.0	19.0	-3647	-6497	29219	37049	7143.3	4974.8	-4679		
14	Gjoa	68.64	-95.85	10.8	-2.2	99.1	103.2	0.0	45.1	9.5	-14.1	0.0	0.0	0.0	0.0	101.0	15.5	-14.1	21.0	70.0	77.0	4.0	0.0	116.0	57.0	-5135	-5903	29957	36847	0	5675.4	-5996		
15	Cambridge	69.11	-105.14	12.8	-3.3	98.8	103.3	24.1	48.3	9.3	-13.4	0.0	0.0	0.0	0.0	101.3	19.2	-13.4	24.0	117.0	49.0	3.0	5.0	159.0	65.0	-4887	-8142	27312	36993	6097.2	7002.9	-6164		
16	Talyoak	69.55	-93.58	-41.6	-54.2	66.8	98.0	0.8	0.0	-40.3	-13.8	80.0	20.5	16.2	101.2	103.8	47.3	14.4	13.8	12.4	5.8	0.7	3.5	6.5	13.8	28	113	36	3	1	92	44		_
17	Clyde	70.49	-68.52	15.1	-2.0	99.0	103.5	15.0	50.9	7.3	-11.2	0.0	0.0	0.0	0.0	100.9	16.4	-11.2	2.0	68.0	30.0	11.0	2.0	108.0	28.0	-4093	-6842	27370	36835	4519.9	5967.7	-5401		
18	Pond	72.68	-77.98	16.1	-2.0	99.8	103.2	15.0	34.7	12.3	-13.2	0.0	0.0	0.0	0.0	100.5	9.1	-13.2	22.0	91.0	15.0	19.0	0.0	22.0	71.0	-4804	-6864	26230	36700	5036.8	3310.5	-6281		
19	Nanasivik	72.98	-84.62	14.1	-3.0	100.0	95.4	64.4	25.0	12.6	-12.5	0.0	0.0	0.0	0.0	93.2	4.0	-12.5	1.0	32.0	59.0	230.0	8.0	4.0	8.0	-2870	-4453	18004	21437	6337.8	1454.9	-3570		
20	Resolute	74.72	-94.99	11.0	-2.7	100.0	103.4	24.1	52.1	9.8	-14.4	0.0	0.0	0.0	0.0	100.7	18.7	-14.4	13.0	113.0	52.0	14.0	5.0	146.0	76.0	-5238	-8317	26059	36749	6505.7	6819.6	-6725		
21	Eureka	79.98	-85.93	14.0	-1.0	92.5	104.2	64.4	40.8	7.5	-17.9	0.0	0.0	0.0	0.0	101.5	9.4	-17.9	84.0	105.0	5.0	1.0	0.0	46.0	120.0	-6530	-7069	25646	37036	13526	3432.6	-7935		
22	Alert	82.52	-62.28	8.0	-1.0	100.0	104.3	15.0	60.1	2.4	-16.3	0.0	0.0	0.0	0.0	101.2	10.2	-16.3	18.0	98.0	103.0	4.0	2.0	44.0	49.0	-5929	-8097	27425	36723	4454	3715.6	-6177		
23	Grise			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0		
24																																		_
H	с►яД	Summa	n ry / Alert	t / Tal	lyoak ,	/ San	ikilluaq	/ Re	esolute	/ Cha	art1 /	Repul	se / F	Rankin ,	(Qik	iqtarjua	aq 🖉	Pond /	Pang	gnirtug	I∕N	lanasivik	_/ Ku	ıgluktuk	< ∕ Ki	mmiru	t / Io	jaluit /	(Grise	•, ▲				· .

Weather Stations

Trial Weather Station in Rankin Inlet - 2010 - Research station used for 'show and tell' lesson - Student involvement and interest was high

Purchase and Distribution of Inexpensive Stations

- Proposed at a STAR board meeting (thanks -Klaus Hocheim)
- Supported by NT Dept. of Ed.
- Distribution June 2010 to all high schools



School Weather Stations

Cumulus - Open Source Software Locally saved data FTP/WEB data backup/sharing - Website Capable

Longevity??

Purpose:

- lyr dataset
- Promotional



File About											
Console Rules	System Checks										
Pause all system checks below?											
Chec	ck if		eMail text if check fails								
🗹 Cu	umulus Running		cumulus has stopped running								
Cumulus			· · · · · · · · · · · · · · · · · · ·								
File Edit View C	Configuration Help										
	My West	hor		11 June 2	010 15:16:08						
	Ny weat	iner .									
New moon	Dawn 15:38 Di	un sets 0 usk 0	8:39 Daylength 16:17 Tomorro 9:23 Daylight 17:45	w +0m 5/s Moon rises 15:5 Moon sets 07:4	2 25 20 25 20						
					15 Wind m/s 35						
Outdoor		Rainfall		Indoor							
Temp	16.5 °C	Rate	0.0 mm/hr	Temp 24.0 °C	= 45						
Trend	-0.1 °C/hr	Last Hou	r 0.0 mm	Humidity 49 %	50						
Avg Temp Wind Chill	14.4 °C	Yesterda	0.0 mm	Status	0 50						
Heat Index	16.5 °C	This mor	th 41.7 mm	New Record Error							
Dewpoint	13.4 °C	This year	261.0 mm	- 200	NW NE						
Rel Hum	82 %										
Wind - F1 Light	t air	Recent E	xtremes		w - 315° - E						
Latest	1.0 m/s	title bare	Today	Yesterday							
Bearing	315 NW	High Gus	t 6.5 m/s at 11:52	4.8 m/s at 19:34	SW T SE						
Average	0.3 m/s	Bearing	292 ° WNW	202 ° SSW							
Avg Dir	255 ° WSW	Min Tem	p 12.3 °C at 01:38	7.2 °C at 03:22	NNW NNE						
Wind Run	52.3 km	Max Terr	np 17.6 °C at 12:22	15.6 °C at 18:52							
Barometer - Ri	ising slowly	Min Pres	sure 993.5 nPa at 02:22	994.7 hPa at 18:47	w AND KAAN E						
Pressure	996.2 hPa	Rain Rate	e 0.0 mm/hr at 00:00	82.8 mm/hr at 14:21							
Trend	+0.4 nPa/nr				SW SE						
					SSW S SSE						
		125									
		_		NNW	N NNE						
	Outsid	e Te	mperature (°C)	NW A	- NE						
/.											
2	2			WNW							
	. .	1	i i i i i i i i i i i i i i i i i i i								
10-											
+0_ 1	8	1-1			E I						
15	- i	<u> </u>									
+5. 1		1		wsw							
>	. 1	1	1 I I I		() > ()						

11:00 11:15 11:30 11:45 12:00 12:15

รพ

SSW







50

Global Energy

Exercise focused on visualizing
Global processes seen via maps
Produced by students or used as question/discussion piece

- Wealth of options and materials
- Adapted for grade 12 and NT
- Requires testing however wealth
- of options allows teacher adaptation







Where the weather comes from

Finding the best data/visuals available...
Coverage of the Arctic hard to find
Easy access tools or archive for teachers
Likely teacher/locally dependent...

... At least we give them the info and tools ...



ree Download M	anager									X
View Downloads	Options Too	ls Help								
		4	1) 📿 🚇) 🔅 🗶) 🥪	?			
nloads Flash video	downloads S	icheduler Site B	Explorer S	Site Manager	HTML Spider	<<				
Not completed+Recent	File name		Size	Downloaded	Time r	Sections	Speed	Co	Added	
All downloads (15)	🔮 canadasat 72	0x486(746).jpg	59.2 KB	100% [59.2 KB]		0/1			23/03/2010, 2:59:08 PM	
Music	🔮 afsx 500p ini	t(24).aif	31.9 KB	100% [31.9 KB]		0/1			10/06/2010. 9:08:45 AM	
Software		f	160 KB	100% [160 KB]		0/1			10/06/2010, 10:52:44 AM	
- Video	✓ 640x480_cum	ents_nam_dewpoints	57.2 KB	100% [57.2 KB]		0/1			10/06/2010, 10:57:12 AM	
Filters	✓ 640x480_cum	ents_nam_pressure_i1	63.3 KB	100% [63.3 KB]		0/1			10/06/2010, 10:57:17 AM	
- Complete	✓ 640x480_cum	ents_nam_windspeed	50.2 KB	100% [50.2 KB]		0/1			10/06/2010, 10:57:24 AM	
In progress	✓ 640x480_cum	ents_nam_humidity_i	57.2 KB	100% [57.2 KB]		0/1			10/06/2010, 10:57:32 AM	
Stopped	✓ 640x480_cum	ents_nam_temperatur	60.8 KB	100% [60.8 KB]		0/1			10/06/2010, 10:57:37 AM	
Scheduled	✓ 9jh(2).gif		151 KB	100% [151 KB]		0/1			10/06/2010, 10:58:00 AM	
History Recycle Pin		f	159 KB	100% [159 KB]		0/1			10/06/2010, 10:58:15 AM	
Necycle bill		f	157 KB	100% [157 KB]		0/1			10/06/2010, 10:58:19 AM	
		£	160 KB	100% [160 KB]		0/1			10/06/2010, 10:58:22 AM	
	🔹 ir_ICAO-I_bi	v(6).jpg	310 KB	100% [310 KB]		0/1			10/06/2010, 3:24:10 PM	
	✓ ir_ICAO-H_b	w(6).jpg	378 KB	100% [378 KB]		0/1			10/06/2010, 3:27:37 PM	
	💙 Irgnamsfowbo	q(6).qif	384 KB	100% [384 KB]		0/1			10/06/2010, 3:28:21 PM	1
	100 E Prograss 🐻 Mada praviaw/convert 🖾 Oninipos									
	Time	Date Inf	ormation		- opinions	1				^
	3:05:01 AM	11/05/2010 One	ning file on th	e disk						
	3:05:01 AM	11/06/2010 File	already exists.	Rename to "Ironan	nsfawba(4).aif"					
	>> 3:05:01 AM	11/06/2010 Suc	ceeded	-						
	>> 3:05:01 AM	11/06/2010 [Sec	tion 1] - Start	ed						
	>> 3:05:01 AM	11/06/2010 [Sec	tion 1] - Down	nloading						
	3:05:01 AM	11/06/2010 Cres	ating new sect	on						
	>> 3:05:01 AM	11/06/2010 Can	celled							
	 3:05:01 AM 2:05:01 AM 	11/06/2010 [Sec	wolcard complete	-						
	9:05:00 AM	11/06/2010 DOV	ting download	.e						
	🐲 9:05:00 AM	11/06/2010 Ope	ning file on th	e disk						
	9:05:00 AM	11/06/2010 File	already exists.	Rename to "Irgnan	nsfcwbg(5).gif"					=
	>> 9:05:00 AM	11/06/2010 Suc	ceeded							
	>> 9:05:00 AM	11/06/2010 [Sec	tion 1] - Start	ed						
	>> 9:05:00 AM	11/06/2010 [Sec	tion 1] - Down	nloading						_
	9:05:00 AM	11/06/2010 Cres	ating new sect	on						
	>> 9:05:00 AM	11/06/2010 Can	celled							
	 9:05:01 AM 9:05:01 AM 	11/06/2010 [Sec	upload complet	he in the second se						~
			and the second of the second							

Reading Weather Maps

Focus on Application ...

- Spatial timing when will it reach X:
 Evolution with time
- Associated weather observations

.. and learn the fundamentals on the way ...





Sea Ice and Weather

Data generation and graphing ... - Visual exercise used to introduce skil - Still need link to weather...?

... and link with Climate Change & Perspectives on changing environment.



					_
	А	В	С	D	
1	Year	Area(km^2x10^6)	Area		
2	1978	0.81125	1298		
3	1979	0.333125	533		
4	1980	0.528125	845		
5	1981	0.201875	323		
6	1982	0.60375	966		
7	1983	0.264375	423		
8	1984	0.528125	845		
9	1985	0.6375	1020		
10	1986	0.92625	1482		
11	1987	0.46625	746		
12	1988	0.928125	1485		
13	1989	0.6525	1044		
14	1990	0.27	432		
15	1991	0.43	688		
16	1992	0.6225	996		
17	1993	0.754375	1207		
18	1994	0.126875	203		
19	1995	0.448125	717		
20	1996	0.198125	317		
21	1997	0.355	568		
22	1998	0.038125	61		
23	1999	0.16125	258		
24	2000	0.2525	404		
25	2001	0.199375	319		
26	2002	0.405625	649		
27	2003	0.0675	108		
28	2004	0.30375	486		
29	2005	0.225	360		
30	2006	0.036875	59		
31	2007	0.233125	373		
32					
4	▶ N\Te	nd NovemberResults	_modified /	/	
		A			



HOW

does this approach fit in a research never: Answer: Outreach throughout the project (... proposal and planning all the way through to the end ...)

Outreach began after the field component Answer: Too Late! Valuable opportunities lost

Funding secured separately from research Answer: If funding agencies desire outreach include from the beginning

Outreach Coordinator handles all of outreach Answer: One person always playing catch-up

Does it require specialized staff? Answer: Maybe Not?

FUTURE STEPS

but still related to the research goals ...

We accept the broader interpretation of STAR: "... improve understanding and of severe arctic storms and the Importance of weather and climate to the future of the Arctic..."

And...

Help us to PUNCTUATE the curriculum materials with your work

- Open to suggestions on how to make this happen

SUMMARY

Who?

- Identify your target audience
- evaluate based on Size, fit, and longevity

When?

- coordinate scheduling and delivery
- adapt (req. support of funding/reporting)

What?

- flexible to user needs, stay within network goals
- focus on products with a purpose

How?

- include outreach from start to finish,
- incorporate with core network staff

Why? Remember ...

- ... you don't reach out (outreach) for your benefit ...
- ... but for the benefit of others!

