

**Sanford Underground Research Facility E&O Department –
Update for Cultural Advisory Committee November 18, 2021
July 12 – Nov 12, 2021**

OVERVIEW

The Sanford Underground Research Facility (SURF) Education and Outreach Department consists of five full time staff employed through a memo of understanding with Black Hills State University. Accomplishments for this period and goals for the coming months for each of our ‘buckets of work’ are summarized below:

A. PROFESSIONAL DEVELOPMENT

Accomplishments

- The professional development (PD) opportunities given in Table 1 were facilitated or co-facilitated with the E&O team. A total of 230 educators participated.
- Monthly afterschool PD sessions for Harrisburg School District are ongoing and are being facilitated as a combination of face-to-face and virtual sessions.
- We have laid out a schedule for summer PD courses for 2022.

Short term Goals

- Plan and implement online PD courses in both math and science through BHSU during the spring semester
- Detailed planning of the content for summer PD courses

B. CURRICULUM RESOURCES

We continue to develop and revise curriculum units in order to give students deep dives into science content and teachers exemplars for effective 3-dimensional instruction.

Accomplishments

- Table 2 lists curriculum units completed in classrooms during this period. A total of 1,281 students participated. Schools with greater than 10% or 50% Native American population are shaded.
- *Move It!* was revised based on feedback from teachers who piloted last spring and the kits were completed.
- Lesson 3 of *The Search for Dark Matter* was rewritten to replace online resources that required the now defunct Flash app.
- A first draft of the curriculum unit review tool has been tested by the team on a unit and revisions of the tool are in progress.
- The EPSCoR curriculum units which were written by teacher leaders and shepherded by our team were tested with teachers during the Level 2 PD sessions in July. Students will be hired this spring to build material kits for each unit.

Short term Goals

- Finalize the review tool and develop a plan for regular review and revision, as needed, of SURF curriculum units.
- Finish last two lessons of *Sound and Light* and order materials for a third kit.
- Revise *Waterworks* with additional scaffolding for educators.
- Make a place-based version of *Waterworks* for Isna Wica Owyawa school.

C. PRESENTATIONS AND FIELD TRIPS

Direct student interactions have always been an important component of the E&O program. With COVID numbers increasing in September, onsite field trips were limited and not available for K-12 student groups. However, we have had an extensive program of school visits this fall, both face-to-face and virtual.

Accomplishments

- New staff members were trained in the various presentations we have available.

- Table 3 lists the presentations that have taken place in this period. A total of 5,619 students at 37 schools in 24 South Dakota counties have participated. Schools with more than 10% or 50% American Indian population are shaded.

Short term Goals

- Present at the upcoming Indian Education Summit and SDStem Conference and continue to reach out in other ways to teachers at rural and tribal schools
- Train new staff in the various field trip activities we have developed in anticipation of a spring field trip season in 2022

D. GLOBAL REACH

Accomplishments

- Virtual presentations this fall included a physics club in Minnesota and a school in Melbourne, Australia.

Short Term Goals

- Present in February to an organization of Victoria, Australia physics teachers and make connections to the new dark matter experiment in Australia
- Present at physics and astronomy education conferences in order to make connections to further our reach
- Continue to leverage new opportunities to creatively unlock the potential reach to a global community.

E. POST-SECONDARY

The E&O team continues to manage the Davis-Bahcall Scholars program and the Sanford Lab internship program. In addition, the team is moving forward to establish partnerships with education programs at multiple South Dakota universities.

Accomplishments

- The team participated in the fall virtual career fair at SDSMT.
- 44 education students from BHSU participated in a field trip to SURF which combined a Hoistroom tour with one of our field trip activities and a discussion of student engagement.
- Initial Zoom meetings were held with education faculty at several South Dakota universities to brainstorm ideas for collaboration.

Short Term Goals

- Attract a pool of applications for the internship and Davis-Bahcall programs that reflect the demographics of the state
- Present in spring education courses at NSU, DSU and USD
- Contact faculty at tribal colleges that teach ethnobotany to discuss partnering on K-12 programming for the sacred garden

F. PROFESSIONAL GROWTH

The E&O team recognizes that in order to serve our WHY and to provide the best service to our stakeholders, we need to continue to grow both collectively and individually.

Accomplishments

- Three members of the team attended a workshop on *Embedding Formative Assessment* with Dylan Williams organized by the Department of Education.
- Members of the group continue to participate in ongoing PAGE training as much as possible, and network with members of the Department of Education and others who also attended the training last year.
- The group is continuing a book study on *Culturally Responsive Pedagogy*.

Short Term Goals

- Continue to grow our own understanding in these areas so that we can effectively include them in future PD offerings.

Table 1. Professional Development (July 12 – Nov 12, 2021)

School or Organization / Location	Description	Total No. of teachers / admin
<i>National/Regional Partners</i>		
SEPA (Univ of Nebraska Medical Center)	July 2021 (2 day) – f2f	18
<i>Statewide Partners</i>		
EPSCoR #2 Train the Trainer	July 2021 (5 day) – virtual	10
EPSCoR #2 PD	July 2021 (3 day) - virtual	71
SDMath/SDSci (DOE) Cohort 4	July 2021 (2 day) – f2f	17
SDMath/SDSci (DOE) Cohort 5	Sept 2021 (2 day) – f2f	19
SDMath/SDSci (DOE) Veteran’s Retreat	Oct 2021 (2 day) – f2f	17
<i>Local School Districts</i>		
Harrisburg School District	Sept, Oct 2021 (2 hr each) -f2f	65
<i>Conferences</i>		
SD Council of Math Teachers	July 2021	13
		230 educators

Table 2. Curriculum Units Completed –July 12 – Nov 12, 2021

Unit	County	City	School	Grade or Course (high school)	Total # of students
As a Matter of Fact	Butte	Belle Fourche	South Park Elem	1	25
	Minnehaha	Colton	Tri-Valley Elem		80
		Garretson	Garretson Elem	2	18
Between a Rock and a Dark Place	Brookings	Brookings	Dakota Prairie	1	50
Creature Features	Meade	Whitewood	Whitewood Elem	2	17
	Minnehaha	Sioux Falls	Westside Christian	1	20
	Pennington	Rapid City	Valley View Elem	2	25
Exploring the Unseen	Bon Homme	Scotland	Scotland Elem		68
	Butte	Belle Fourche	Belle Fourche MS	5	105
	Lawrence	Spearfish	West Elem	2	90
Ghost Particles	Meade	Sturgis	Sturgis Interm	5	110
Move It!	Meade	Sturgis	Sturgis Elem	2	24
Perplexing Puddles	Meade	Sturgis	Sturgis Brown HS	Academy	25
The Search for Dark Matter	Deuel	Clear Lake	Deuel HS	Chemistry	15
	Jerauld	Wessington Springs	Wessington Springs MS	7,8	48
	Lawrence	Spearfish	Spearfish MS	6	94
There and Back Again	Corson	McLaughlin	McLaughlin Elem	5	15
Waterworks	Pennington	Box Elder	Douglas MS	7	110
‘We are Made of Starstuff’	Brookings	Brookings	Brookings HS	Chemistry	191
	Deuel	Clear Lake	Deuel HS	Chemistry	15
	Minnehaha	Sioux Falls	Jefferson HS	Chemistry	100
	Perkins	Bison	Bison HS	Chemistry	36
	<i>11 counties</i>		<i>21 schools</i>		1,281 students
LEGEND		>50% AI	> 10% AI		

Table 3. Presentations & Field Trips –July 12 – November 12, 2021

County	School/City	Grade(s) or course	# and mode	Total No. of students
Beadle	Madison 2-3 Center / Huron	2-3	10 / f2f	446
	Huron MS / Huron	6-8	11 / virtual	686
	Kindernook preschool / Huron	preK	1 / f2f	19
	Wolsey-Wessington / Wessington	K-12	6 / f2f	337
Bon Homme	Avon Schools / Avon	K-12	7 / f2f	240
	Scotland Schools / Scotland	K-12	7 / f2f	283
Brookings	Dakota Prairie Elem / Brookings	1	1 / virtual	44
	Sioux Valley Elem / Volga	preK-5, 8	9 / f2f	396
Brown	Warner Schools / Warner	K – 12	7 / f2f	316
Brule	Chamberlain HS / Chamberlain	Earth sci	2 / f2f	33
Butte	South Park Elem / Belle Fourche	K-4	1 / virtual	18
Charles Mix	Wagner HS / Wagner	Phys Sci/phys	3 / f2f	52
Custer	Custer Elem / Custer	5	1 / virtual	46
Dakota, MN	Burnsville HS / Burnsville	Phys club	1 / virtual	1
Davison	Mt Vernon Elem/MS / Mt Vernon	K-8	5 / f2f	146
Deuel	Clear Lake / Deuel	K-12	11 / f2f	571
Douglas	Armour Schools / Armour	preK – 12	6 / f2f	158
Hughes	T.F. Riggs HS / Pierre	GIS	2 / virtual	56
Hutchinson	Freeman HS / Freeman	Capstone	1 / f2f	21
	Parkston HS / Parkston	Adv Chem	1 / f2f	16
Jackson	Kadoka Elem / Kadoka	5	1 / virtual	29
Kingsbury	Iroquois / Iroquois	K-12	6 / f2f	199
Lake	Oldham-Ramona / Oldham	K-12	4 / f2f	108
Lawrence	West Elem / Spearfish	2	4 / f2f	168
Minnehaha	Baltic Schools / Baltic	K-5, 10	6 / f2f	230
	Garretson Elem / Garretson	K – 3, 5	6 / f2f	145
	Roosevelt High / Sioux Falls	Astronomy	3 / f2f	47
	West Central Elem / Hartford	1	2 / f2f	93
Pennington	Hill City Elem/MS / Hill City	2, MS	3 / f2f	80
	New Underwood Elem	5	1 / virtual	25
Potter	Gettysburg Elem/MS / Gettysburg	K – 8	6 / f2f	159
	Hoven Schools / Hoven	preK – 12	6 / f2f	103
Spink	Northwestern Schools / Mellette	K – 12	7 / f2f	285
Stanley	Stanley County Elem / Ft Pierre	4 – 5	4 / f2f	68
Turner	Viborg-Hurley / Viborg	K – 4	3 / f2f	124
Victoria, Australia	Simmonds Catholic College / Melbourne	Physics	1 / virtual	13
Walworth	Mobridge-Pollock HS / Mobridge	Biology	4 / f2f	58
26 counties	37 schools		156 presentations	5,619 students
LEGEND		>50% AI	> 10% AI	