U.S. Department of Education

Washington, D.C. 20202-5335

APPLICATION FOR GRANTS UNDER THE

Application for New Grants Under the Competitive Grants for State Assessment Program

CFDA # 84.368A

PR/Award # S368A200001

Gramts.gov Tracking#: GRANT13152626

OMB No. , Expiration Date:

Closing Date: Jun 30, 2020

Table of Contents

This application was generated using the PDF functionality. The PDF functionality automatically numbers the pages in this application. Some pages/sections of this application may contain 2 sets of page numbers, one set created by the applicant and the other set created by e-Application's PDF functionality. Page numbers created by the e-Application PDF functionality will be preceded by the letter e (for example, e1, e2, e3, etc.).

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 06/25/2020

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Nebraska Department of Education

* b. Employer/Taxpayer Identification Number (EIN/TIN): 470491233

* c. Organizational DUNS: 8088198820000

d. Address:

* Street1: 301 Centennial Mall South
Street2: P.O. Box 94987
* City: Lincoln
County/Parish: Lancaster
* State: NE: Nebraska
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 68509-4987

e. Organizational Unit:

Department Name: Teaching,Learning & Assessment

Division Name: Statewide Assessment

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Ms.
* First Name: Rhonda
Middle Name:
* Last Name: True
Suffix:

Title: Enhanced Assessment Grant Coordinator

Organizational Affiliation: NDE

* Telephone Number: 402-471-2947
Fax Number:

* Email: rhonda.true@nebraska.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Department of Education

11. Catalog of Federal Domestic Assistance Number:

84.368

CFDA Title:

Competitive Grants for State Assessments (formerly Grants for Enhanced Assessment Instruments)

*** 12. Funding Opportunity Number:**

ED-GRANTS-050120-002

* Title:

Office of Elementary and Secondary Education (OESE): Competitive Grants for State Assessments Program CFDA Number 84.368A

13. Competition Identification Number:

84-368A2020-1

Title:

Office of Elementary and Secondary Education (OESE): Competitive Grants for State Assessments Program CFDA Number 84.368A

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Stackable, Instructionally-embedded, Portable Science (SIPS)

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: NE-001 * b. Program/Project: US-ALL

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 10/01/2020 * b. End Date: 09/30/2023

18. Estimated Funding ($):

* a. Federal	2,999,877.50
* b. Applicant	0.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	2,999,877.50

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Dr. * First Name: Jeremy

Middle Name:

* Last Name: Heneger

Suffix:

* Title: Director of Statewide Assessment

* Telephone Number: 402-471-2495 Fax Number:

* Email: jeremy.heneger@nebraska.gov

* Signature of Authorized Representative: Jeremy Heneger * Date Signed: 06/25/2020

Tracking Number:GRANT13152626 Funding Opportunity Number:ED-GRANTS-050120-002 Received Date:Jun 25, 2020 04:46:06 PM EDT

U.S. DEPARTMENT OF EDUCATION
BUDGET INFORMATION
NON-CONSTRUCTION PROGRAMS

OMB Number: 1894-0008
Expiration Date: 08/31/2020

Name of Institution/Organization

Nebraska Department of Education

Applicants requesting funding for only one year should complete the column under "Project Year 1." Applicants requesting funding for multi-year grants should complete all applicable columns. Please read all instructions before completing form.

SECTION A - BUDGET SUMMARY
U.S. DEPARTMENT OF EDUCATION FUNDS

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)
1. Personnel	68,000.00	70,000.00	72,000.00			210,000.00
2. Fringe Benefits	31,280.00	32,200.00	33,120.00			96,600.00
3. Travel	19,467.00	29,200.50	29,200.50			77,868.00
4. Equipment	25,000.00	0.00	0.00			25,000.00
5. Supplies	0.00	0.00	0.00			0.00
6. Contractual	791,454.32	880,290.63	805,379.55			2,477,124.50
7. Construction	0.00	0.00	0.00			0.00
8. Other	0.00	0.00	0.00			0.00
9. Total Direct Costs (lines 1-8)	935,201.32	1,011,691.13	939,700.05			2,886,592.50
10. Indirect Costs*	24,426.00	24,426.00	24,428.00			73,280.00
11. Training Stipends	0.00	24,570.00	15,435.00			40,005.00
12. Total Costs (lines 9-11)	959,627.32	1,060,687.13	979,563.05			2,999,877.50

Indirect Cost Information** ***(To Be Completed by Your Business Office):

If you are requesting reimbursement for indirect costs on line 10, please answer the following questions:

(1) Do you have an Indirect Cost Rate Agreement approved by the Federal government? ☒ Yes ☐ No

(2) If yes, please provide the following information:

Period Covered by the Indirect Cost Rate Agreement: From: 07/01/2020 To: 06/30/2023 (mm/dd/yyyy)

Approving Federal agency: ☒ ED ☐ Other (please specify):

The Indirect Cost Rate is 12.70 %.

(3) If this is your first Federal grant, and you do not have an approved indirect cost rate agreement, are not a State, Local government or Indian Tribe, and are not funded under a training rate program or a restricted rate program, do you want to use the de minimis rate of 10% of MTDC? ☐ Yes ☐ No If yes, you must comply with the requirements of 2 CFR § 200.414(f).

(4) If you do not have an approved indirect cost rate agreement, do you want to use the temporary rate of 10% of budgeted salaries and wages?

☐ Yes ☐ No If yes, you must submit a proposed indirect cost rate agreement within 90 days after the date your grant is awarded, as required by 34 CFR § 75.560.

(5) For Restricted Rate Programs (check one) -- Are you using a restricted indirect cost rate that:

☐ Is included in your approved Indirect Cost Rate Agreement? Or, ☐ Complies with 34 CFR 76.564(c)(2)? The Restricted Indirect Cost Rate is ____ %.

Name of Institution/Organization	Applicants requesting funding for only one year should complete the column under "Project Year 1." Applicants requesting funding for multi-year grants should complete all applicable columns. Please read all instructions before completing form.	
Nebraska Department of Education		

SECTION B - BUDGET SUMMARY
NON-FEDERAL FUNDS

Budget Categories	Project Year 1 (a)	Project Year 2 (b)	Project Year 3 (c)	Project Year 4 (d)	Project Year 5 (e)	Total (f)
1. Personnel						
2. Fringe Benefits						
3. Travel						
4. Equipment						
5. Supplies						
6. Contractual						
7. Construction						
8. Other						
9. Total Direct Costs (lines 1-8)						
10. Indirect Costs						
11. Training Stipends						
12. Total Costs (lines 9-11)						

SECTION C - BUDGET NARRATIVE (see instructions)

ED 524

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013
Expiration Date: 02/28/2022

1. * Type of Federal Action:
- [ ] a. contract
- [x] b. grant
- [ ] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:
- [ ] a. bid/offer/application
- [x] b. initial award
- [ ] c. post-award

3. * Report Type:
- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[x] Prime [ ] SubAwardee

** Name:* Nebraska Department of Education

** Street 1:* 301 Centennial Mall South *Street 2:*

** City:* Lincoln *State:* NE: Nebraska *Zip:* 68509-4987

Congressional District, if known: NE-001

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

6. * Federal Department/Agency:

United States Department of Education

7. * Federal Program Name/Description:

Competitive Grants for State Assessments (formerly Grants for Enhanced Assessment Instruments)

CFDA Number, *if applicable:* 84.368

8. Federal Action Number, *if known:*

9. Award Amount, *if known:*

$

10. a. Name and Address of Lobbying Registrant:

Prefix: ** First Name:* NA *Middle Name:*

** Last Name:* NA *Suffix:*

** Street 1:* NA *Street 2:*

** City:* NA *State:* *Zip:*

b. Individual Performing Services (including address if different from No. 10a)

Prefix: ** First Name:* NA *Middle Name:*

** Last Name:* NA *Suffix:*

** Street 1:* NA *Street 2:*

** City:* NA *State:* *Zip:*

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

*** Signature:** Jeremy Heneger

***Name:** *Prefix:* Dr. ** First Name:* Jeremy *Middle Name:*

** Last Name:* Heneger *Suffix:*

Title: **Telephone No.:** **Date:** 06/25/2020

Federal Use Only:

Authorized for Local Reproduction
Standard Form - LLL (Rev. 7-97)

NOTICE TO ALL APPLICANTS

The purpose of this enclosure is to inform you about a new provision in the Department of Education's General Education Provisions Act (GEPA) that applies to applicants for new grant awards under Department programs. This provision is Section 427 of GEPA, enacted as part of the Improving America's Schools Act of 1994 (Public Law (P.L.) 103-382).

To Whom Does This Provision Apply?

Section 427 of GEPA affects applicants for new grant awards under this program. **ALL APPLICANTS FOR NEW AWARDS MUST INCLUDE INFORMATION IN THEIR APPLICATIONS TO ADDRESS THIS NEW PROVISION IN ORDER TO RECEIVE FUNDING UNDER THIS PROGRAM.**

(If this program is a State-formula grant program, a State needs to provide this description only for projects or activities that it carries out with funds reserved for State-level uses. In addition, local school districts or other eligible applicants that apply to the State for funding need to provide this description in their applications to the State for funding. The State would be responsible for ensuring that the school district or other local entity has submitted a sufficient section 427 statement as descr bed below.)

What Does This Provision Require?

Section 427 requires each applicant for funds (other than an individual person) to include in its application a description of the steps the applicant proposes to take to ensure equitable access to, and participation in, its Federally-assisted program for students, teachers, and other program beneficiaries with special needs. This provision allows applicants discretion in developing the required description. The statute highlights six types of barriers that can impede equitable access or participation: gender, race, national origin, color, disability, or age. Based on local circumstances, you should determine whether these or other barriers may prevent your students, teachers, etc. from such access or participation in, the Federally-funded project or activity. The description in your application of steps to be taken to overcome these barriers need not be lengthy; you may provide a clear and succinct description of how you plan to address those barriers that are applicable to your circumstances. In addition, the information may be provided in a single narrative, or, if appropriate, may be discussed in connection with related topics in the application.

Section 427 is not intended to duplicate the requirements of civil rights statutes, but rather to ensure that, in designing their projects, applicants for Federal funds address equity concerns that may affect the ability of certain potential beneficiaries to fully participate in the project and to achieve to high standards. Consistent with program requirements and its approved application, an applicant may use the Federal funds awarded to it to eliminate barriers it identifies.

What are Examples of How an Applicant Might Satisfy the Requirement of This Provision?

The following examples may help illustrate how an applicant may comply with Section 427.

(1) An applicant that proposes to carry out an adult literacy project serving, among others, adults with limited English proficiency, might descr be in its application how it intends to distr bute a brochure about the proposed project to such potential participants in their native language.

(2) An applicant that proposes to develop instructional materials for classroom use might describe how it will make the materials available on audio tape or in braille for students who are blind.

(3) An applicant that proposes to carry out a model science program for secondary students and is concerned that girls may be less likely than boys to enroll in the course, might indicate how it intends to conduct "outreach" efforts to girls, to encourage their enrollment.

(4) An applicant that proposes a project to increase school safety might describe the special efforts it will take to address concern of lesbian, gay, bisexual, and transgender students, and efforts to reach out to and involve the families of LGBT students.

We recognize that many applicants may already be implementing effective steps to ensure equity of access and participation in their grant programs, and we appreciate your cooperation in responding to the requirements of this provision.

Estimated Burden Statement for GEPA Requirements

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The obligation to respond to this collection is required to obtain or retain benefit (Public Law 103-382). Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the U.S. Department of Education, 400 Maryland Ave., SW, Washington, DC 20210-4537 or email ICDocketMgr@ed.gov and reference the OMB Control Number 1894-0005.

Optional - You may attach 1 file to this page.

1238-SIPS GEPA Statement.pdf | Add Attachment | Delete Affachment | View Attachment

GEPA Statement

Nebraska Department of Education Competitive Grants for State Assessments (CGSA) Application

Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments

With respect to the requirements of General Education Provisions Act, Section 427 (GEPA), the Nebraska Department of Education (NDE) along with project partners will take all steps necessary to ensure equitable access to and participation in the services provided through the project for **all** stakeholders, including state and local administrators, teachers, parents, and students. NDE and the project's state and organizational partners fully support Equal Employment Opportunity and Affirmative Action principles, practices, and programs, and do not discriminate among applicants or employees on the basis of gender, race, color, religion, gender, national origin, political affiliation, marital status, veteran status, or age. Applicants or employees capable of performing the duties of a position or job classification may not be discriminated against because of a physical or mental disability.

In addition, the partner states have strong beliefs about the value of inclusion of individuals with diversity and/or special needs in their educational programs. None discriminate in hiring or employment practices or in the delivery of education or other services. In order to ensure equitable access for all participants, as required by GEPA, NDE will address barriers to participation in five specific ways related to the proposed project.

Steps to Ensure Equitable Access

Step 1. Materials development Assessment materials produced by the proposed project will target students in the general education population, with a particular focus on ensuring the materials are accessible to all students including students with disabilities and English learners.

All materials developed through this project will be reviewed by participating states and national experts for bias/sensitivity and accessibility. In addition, materials developed through this project will be made available in multiple forms to accommodate accessibility needs. Thus, the project's development efforts will deliberately address equitable access and participation by **all** students.

Step 2. Modifications of materials Since the materials developed for the proposed project will be distributed to the partner states, state education agency staff and local educators will be collaborators in making the necessary adjustments to assessment tasks for students with particular accessibility needs. All materials produced through this project will be developed with accessibility in mind, and thus all will be adaptable to accommodate a diverse range of accessibility needs for students, educators, administrators, and parents.

Step 3. Accessibility and accommodations Every effort will be made to ensure full accessibility to meetings, project deliverables, communications, and other project activities. Special accommodations for participants with all types of disabilities, will be made so that educators and state personnel can fully participate. For example, face-to-face meetings will be held at venues that are fully accessible. This includes providing interpreters for staff, partners, and stakeholders who have a disability or limited English proficiency. In addition, all project tools and resources and relevant information will be made publicly available online via the project website, which will be in a format that meets a government or industry-recognized standard for accessibility.

Step 4. Diversity of project staff Diverse groups of people will be involved in developing project activities and in recruitment and retention of participants in the partner states. People with minority status, whether based on gender, race, national origin, color, disability, or age, will be encouraged to participate. Training and professional development for personnel will be available to promote sensitivity and awareness to students with diverse learning needs and to

create a supportive climate that fosters authentic engagement of participating teachers and other project stakeholders.

Step 5. Recruitment of participants Procedures will be in place to ensure equitable access to and participation by teachers and students from diverse groups that represent our state members' widely varying demographic and cultural profiles. Teachers and other stakeholders with minority status, whether based on gender, race, national origin, color, disability, or age will be encouraged to participate. Other unforeseen barriers to full access may be identified as the project gets underway, and NDE will address those barriers as they arise. Within contractual service agreements, NDE requires all entities to encourage applications from underrepresented groups and to identify strategies for doing so.

CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Statement for Loan Guarantees and Loan Insurance

The undersigned states, to the best of his or her knowledge and belief, that:

If any funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this commitment providing for the United States to insure or guarantee a loan, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions. Submission of this statement is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required statement shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

* APPLICANT'S ORGANIZATION	Nebraska Department of Education
* PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE	
Prefix:	Dr.
* First Name:	Jeremy
Middle Name:	
* Last Name:	Heneger
Suffix:	
* Title:	Director of Statewide Assessment
* SIGNATURE:	Jeremy Heneger
* DATE:	06/25/2020

U.S. DEPARTMENT OF EDUCATION
SUPPLEMENTAL INFORMATION
FOR THE SF-424

1. Project Director:

Prefix:	First Name:	Middle Name:	Last Name:	Suffix:
Ms.	Rhonda		True	

Address:

Street1: 301 Centennial Mall South
Street2:
City: Lincoln
County: Nebraska (NE)
State: NE: Nebraska
Zip Code: 68509-4987
Country: USA: UNITED STATES

Phone Number (give area code): 402-471-2947
Fax Number (give area code):

Email Address: rhonda.true@nebraska.gov

2. Novice Applicant:

Are you a novice applicant as defined in the regulations in 34 CFR 75.225 (and included in the definitions page in the attached instructions)?

☐ Yes ☐ No ☒ Not applicable to this program

3. Human Subjects Research:

a. Are any research activities involving human subjects planned at any time during the proposed Project Period?

☐ Yes ☒ No

b. Are ALL the research activities proposed designated to be exempt from the regulations?

☐ Yes Provide Exemption(s) #: ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6

☐ No Provide Assurance #, if available:

c. If applicable, please attach your "Exempt Research" or "Nonexempt Research" narrative to this form as indicated in the definitions page in the attached instructions.

Add Attachment | Delete Attachment | View Attachment

Abstract

The abstract narrative must not exceed one page and should use language that will be understood by a range of audiences. For all projects, include the project title (if applicable), goals, expected outcomes and contributions for research, policy, practice, etc. Include population to be served, as appropriate. For research applications, also include the following:

- Theoretical and conceptual background of the study (i.e., prior research that this investigation builds upon and that provides a compelling rationale for this study)
- Research issues, hypotheses and questions being addressed
- Study design including a brief description of the sample including sample size, methods, principals dependent, independent, and control variables, and the approach to data analysis.

[Note: For a non-electronic submission, include the name and address of your organization and the name, phone number and e-mail address of the contact person for this project.]

You may now Close the Form

You have attached 1 file to this page, no more files may be added. To add a different file, you must first delete the existing file.

* Attachment: 1234-SIPS Project Abstract.pdf | Add Attachment | Delete Attachment | View Attachment

Tracking Number:GRANT13152626 Funding Opportunity Number:ED-GRANTS-050120-002 Received Date:Jun 25, 2020 04:46:06 PM EDT

SIPS Project Objectives and Activities. The Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments project will establish a bank of instructionally-embedded science assessment tasks; build educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances. SIPS brings together eight partner states (Nebraska as lead, along with Alabama, Alaska, Montana, New Mexico, New York, South Carolina, and Wyoming) with technical support from five organizations (edCount, LLC, the Center for Assessment, the Learning Sciences Research Institute at the University of Illinois, Chicago, SRI International, and Creative Measurement, LLC) and an external evaluator (Garrett Consulting, LLC).

To address its objectives, SIPS is organized into six tasks. Task 1 includes **project planning and research** activities. Task 2 involves the articulation of **common construct definitions** and the development of a framework for designing **curriculum maps** and **common assessments**. Task 3 includes the development of **prototype science units** with **common, instructionally-embedded assessments**. Task 4 involves engaging educators in **classroom assessment development workshops** to develop a bank of assessment tasks using a principled-design approach. Task 5 includes a **pilot study** of curriculum prototypes and assessments tasks. Task 6 involves **evaluation** of the project and development of a **dissemination plan**.

Applicable Priorities. Through the SIPS project, we propose to address the Secretary's **Absolute Priority (AP) 3: Developing Innovative Assessment Item Types and Design Approaches**.

Proposed Project Outcomes. SIPS partners will produce generalizable deliverables for use beyond the project states including claims, measurement targets, and performance level

descriptors; end-of-year/course and quarterly student profiles and progressions; curricular alignment tools; curriculum unit templates; instructionally-embedded common assessment tasks; year-long model courses aligned to phenomena and NGSS thematic or topics bundles; process guides articulating the design approach and process; and quarterly reports, annual reports, and a culminating project report.

Number of Participants to be Served. The SIPS project will directly involve key state and local education agency staff, approximately 64 educators, and hundreds of students from the eight participating states. The eight SIPS states serve nearly 800,000 students in our target grades 5 and 8. SIPS will generate widely applicable tools and resources for use and dissemination beyond the participating states and classrooms.

Number and Location of Proposed Sites. Project activities will be conducted virtually as well as on-site (in years 2 and 3, if possible) at local school districts and state education agencies within the eight partner states.

How the Absolute Priorities are Addressed by the Project. The SIPS project will address **AP3a** (*Development of Innovative Item Types*) by using principled-assessment design methodologies to develop innovative three-dimensional performance tasks. SIPS will address **AP3b** (*Development of a Modular Assessment Approach*) by establishing a bank of stackable, instructionally-embedded, portable science assessment tasks. We will address **AP3c** (*Development of a Dissemination Plan*) by developing a dissemination plan to document project processes and outcomes and to share lessons learned and best practices for employing a modular assessment approach.

In addition, SIPS is designed to address all four of the Secretary's Competitive Preference Priorities.

Project Narrative File(s)

* **Mandatory Project Narrative File Filename:** 1235-SIPS Project Narrative.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments

A proposal submitted in response to the Request for Proposals under the Competitive Grants for State Assessments Program, CFDA 84.368A

Project Narrative

Submitted by the
Nebraska Department of Education

June 25, 2020

Project Narrative Table of Contents

List of Exhibits

Need for the Project

The Problem

Most states have adopted new science standards in the past few years and many are struggling to design and implement assessments that adequately reflect these standards and meet professional technical quality standards. This struggle has been exacerbated by the COVID-19 pandemic; states were unable to administer assessments in spring 2020 and, therefore, unable to collect pilot data for newly developed science items or otherwise continue the necessary transition from older tests to newer ones. Many are also now questioning the continued viability of assessments that do not directly support student learning because they are not associated with instruction, are administered at a single point in time late in the school year, and cannot be administered remotely when teachers and students cannot convene in person in their physical classrooms. As devastating as this disruption has been, it offers an unparalleled opportunity for innovation. We have already built the necessary foundation. We are ready to create the tools that educators, students, and parents need to leverage high-quality assessment in ways that prioritize student learning.

A Solution

We propose to build Stackable, Instructionally-embedded, Portable Science assessment tasks (SIPS) to address simultaneously states' needs for large-scale science assessments and the needs of educators, parents, and students for resources that support science learning throughout the school year. SIPS would establish a bank of instructionally-embedded science assessment tasks; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances.

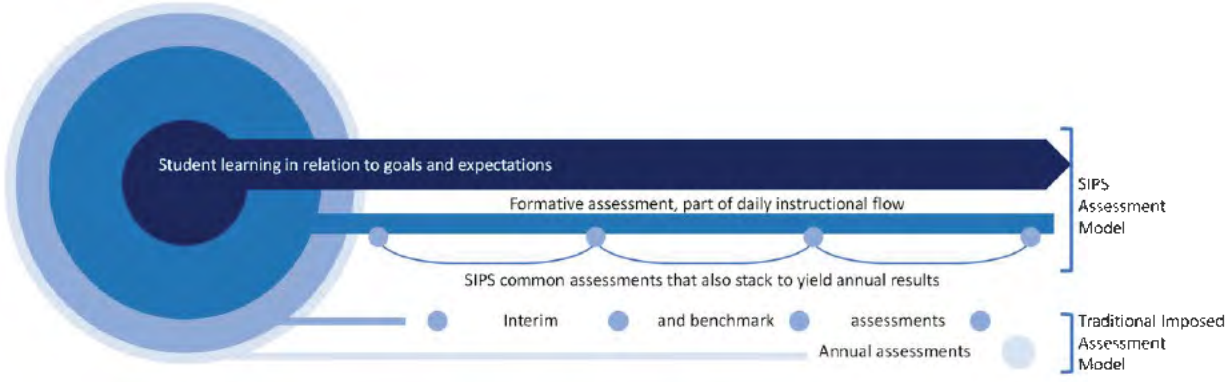
SIPS offers a number of benefits for states and their education stakeholders.

1. Instructionally-embedded science tasks are grounded in learning and yield evidence about what students know and can do when they have had an opportunity to learn what the tasks measure. They offer a leveled playing field not possible with traditional large-scale assessments. Unlike other imposed assessments, the SIPS assessments would be based on the same learning progressions and theory of learning that guide instruction, with appropriate context and grounding in year-long and long-term learning goals. Further, the process of administering the tasks, the scoring process, and the student performance evidence that remains with teachers, parents, and the students themselves all contribute to learning. SIPS assessment tasks give, rather than take away, opportunities to learn.
2. Stackable science assessments are modular. They can be administered throughout the school year, on a flexible schedule at the classroom level and during state- or district-determined testing windows, or in particular patterns that best support their instructional and assessment purposes. There is no need for students and their teachers to stop teaching to prepare for and take tests at the end of every school year.
3. Portable assessments do not rely on a single set of standardized circumstances for administration. If students can convene in physical classrooms, the tasks can be administered there. If students are working from their homes, as may be necessary from time to time in the years ahead, the tasks can be administered there. Test security is not an issue because the tasks are performance-based, designed to be "open-book," evaluated using a set of rubrics completed by multiple reviewers, and embedded in instructional resources that include student- and parent-facing supports.

Traditional large-scale assessments, including recently developed science assessments, do not and cannot offer these benefits. Some are considering "chopping up" their big end-of-year assessments to create mini-tests and then adding an overall score from administrations at points across the school year. Unfortunately, none of the scores from this effort would support meaningful and useful interpretations. What are we learning from a piece of a test administered in September when that piece (a) was designed to be administered at the end of the school year, (b) is not based upon learning progressions that guide instruction, and (c) may have little to do with what students have had an opportunity to learn at that point?

SIPS assessments reflect a different model for assessment as illustrated below. SIPS assessment tasks are meant to be part of the curriculum and to connect naturally with formative assessment strategies in standards-based and competency-based instructional models. Traditional assessments are always steps removed from and require a halt to instruction. SIPS tasks support continuous learning and allow for rich feedback to students during and after their completion (see Exhibit 1).

Exhibit 1. SIPS Model of Assessment[1]



[1] Adapted with permission from the SCILLSS project (SCILLSS, 2017a).

With resources for educators, parents, and students, the SIPS tasks encourage the interaction, discussion, and reflection necessary for learning. There is no black box, no mystery, no sole reliance on scale scores as indicators of what students know and can do. There is evidence in the moment and in the hands of those who need it.

Significance

The SIPS project aims to address states' need for quality, standards-aligned science assessments that generate meaningful, interpretable, and actionable results while also considering the present challenges and potential future ramifications of the COVID-19 pandemic. To accomplish this, we will develop processes, tools and resources aimed at building state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate and effective instructional decisions. In addition, we will engage educators, students, and parents in a partnership for student success across a range of circumstances. Educator and stakeholder capacity-building and engagement throughout the SIPS project will drive meaningful shifts to instructional practice and assessment use as envisioned by the National Research Council's (NRC) *A Framework for K12 Science Education* (*Framework*; NRC, 2012)—a report calling for a re-envisioning of science education that reflects the science, engineering, and technology needs of the 21st century, and engages K–12 students as scientists and engineers in the classroom—and will ensure that the tools, tasks, and deliverables of the project are sustainable and impactful long after the conclusion of the project.

SIPS as an Extension of Current Federally-Funded Projects

SIPS will be built upon two current grant-funded projects that follow the National Research Council's recommendations (NRC, 2014) for developing systems of assessments that align with three-dimensional science standards and support science learning. The Strengthening Claims-

based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS) project is funded by an Enhanced Assessment Grant that the US Department of Education awarded to the Nebraska Department of Education and its partners in 2017. Its purpose is to develop a principled-assessment design (PAD) approach for developing science assessments based on the Next Generation Science Standards (NGSS) or other 3-dimensional, framework (NRC, 2012) based science standards. The Next Generation Science Assessment project (NGSA) has been funded by grants from the National Science Foundation, the Moore Foundation, and the Chan Zuckerberg Initiative. Like SCILLSS, NGSA's purpose is to implement a PAD approach for the generation of NGSS-aligned assessments that can be used by teachers as part of ongoing, everyday instruction.

SCILLSS and NGSA share a common assessment design philosophy that is grounded in the Assessment Triangle (Pellegrino, Chudowsky, & Glaser, 2001) and the necessary coherence among its three elements: (a) cognition, (b) observation, and (c) interpretation (Nichols, Kobrin, Lai, & Koepfler, 2017). We (a) carefully define the expectations for learning in relation to standards as well as to research on how students gain competency toward those standards and (b) design observations (assessment tasks) that can elicit information about students' learning status and progress so that (c) this information can be interpreted and used to support and to evaluate student learning. Further, SCILLSS and NGSA apply a common PAD approach to how we articulate expectations and design observations which begins with a deep analysis of the target domain for assessment and progresses through several steps that culminate in assessment delivery. The Theory of Action (see Exhibit 2) that underlies our approach draws from both of these projects and from the broader research and practice literature. We believe in a coherent model of research-to-practice with rigorous evidence to support design and evaluation decisions.

Exhibit 2. The Theory of Action for SIPS[2]

Both the SCILLSS and NGSA projects are centered on educators' engagement in facilitated processes of unpacking the standards, identifying phenomena or engineering design problems, and creating tasks using expertly crafted task design tools and templates. This core process for SCILLSS has supported two branches of intentionally coherent task development: one that yields tasks for use in classrooms and one for use on large-scale assessments. By connecting the initial standards unpacking to both classroom and large-scale assessment tasks and engaging teachers and other educators in the development processes, the tasks, and ultimately the assessments composed of them, yield evidence of what is actually happening in classrooms and also support and drive better classroom instruction.

[2] Adapted with permission from the SCILLSS project Theory of Action (SCILLSS, 2017b).

The SCILLSS and NGSA projects have provided evidence of validity, efficacy, and utility while simultaneously providing teachers with an abundance of readily accessible tasks. Pilot study results for SCILLSS tasks indicate that teachers gain significant benefits from the development process (SCILLSS, 2017c). They enhance both their understanding of the science standards and their instructional skills in teaching them, suggesting that a process for developing large-scale assessments can effect positive changes in classrooms in real time. Results from multiple studies of the NGSA project's assessments have shown that the tasks are readily useable by students and teachers, support classroom instructional practice, and provide opportunities for implementing formative assessment practices in diverse educational settings (Alozie, et al., 2018; Gane, et al., 2018; Harris et al. 2019; McElhaney et al., 2018; Zaidi et al., 2018). The technology accessible tasks are currently in use by thousands of teachers and students across the country. SCILLSS and NGSA have ample proof of concept evidence to support extension and expansion of their combined efforts.

SIPS represents that extension and expansion in four ways. First, SIPS would apply the SCILLSS and NGSA development approach to the creation of tasks that are administered across, rather than at the end of, the school year. Using research-based learning progressions, inter-connected performance level expectations, and modern psychometric models, these tasks would yield within-year learning evidence applicable within standards-based and competency-based frameworks as well as cumulative evidence in lieu of an end-of-year summative assessment. This model is not available elsewhere because no other approach to large-scale assessment has been constructed using these essential building blocks.

Second, these tasks would be embedded within Understanding by Design (UbD; McTighe & Wiggins, 1998) curriculum maps that include resources to support instruction in relation to the

expectations that the tasks are designed to measure. As such, they can be contextually grounded in ways that support students' optimal demonstration of their knowledge, skills, and competencies (Fischer et al., 1993; Zheng & Fischer, 2002). States would have the option of requiring administration of these tasks while allowing local education agencies the option of implementing the associated curriculum. Third, SIPS would be portable across a range of learning locations. SIPS tasks would engage students in an interactive assessment process with rich phenomena and a performance-based design. Through the use of a set of carefully constructed rubrics, SIPS would yield evidence to guide proximal instructional planning as well as data for use in evaluating students' learning at the end of the year. Fourth, SIPS expands the benefits of SCILLSS and NGSA to several new states and their educator networks. Well-organized collaborative efforts among groups of states enriches the shared set of resources and maximizes the return on tax-payers' investments of their education dollars.

Relevance to Secretary's Priorities

Through the SIPS project, we directly address **Absolute Priority (AP) 3: Developing Innovative Assessment Item Types and Design Approaches**. We address AP3a (*Development of Innovative Item Types*) by using SCILLSS- and NGSS-established PAD methodologies to develop innovative three-dimensional performance tasks that comprise three or more items of varying types (e.g., short response, constructed-response, multiple-choice, model, mathematical representation, etc.) linked with a common stimulus (scenario) grounded in a phenomena or engineering design problem. SIPS instructionally-embedded performance tasks will measure scientific concepts (i.e., the DCIs) as well as the integration of DCIs, CCCs, and SEPs (e.g., observing patterns, deciphering causal relationships, determining structure and function, problem-solving, building and using models, constructing explanations, and processes of

investigation). Our project's research-based, replicable, sustainable methods will provide a clear path and process for SEAs and LEAs to design, build, and evaluate assessments and individual assessment items that support score meaning and use. SIPS will address AP3b (*Development of a Modular Assessment Approach*) by establishing a bank of stackable, instructionally-embedded, portable science assessment tasks that our partner states and states across the country may use. The intent is to employ research-based approaches (i.e., PAD, Universal Design, and Understanding by Design) to articulate a modular assessment approach and curricular tools and resources that any state could use or modify for use as a solution to traditional end-of-year large-scale assessments. We will address AP3c (*Development of a Dissemination Plan*) by developing a dissemination plan to document project processes and outcomes and to share lessons learned and best practices for employing a modular assessment approach with other states and organizations across the country.

In addition, we address **Competitive Preference Priorities (CP) b, d, e, and f**. We address CPb *(Developing or Improving Models for Measuring and Assessing Student Progress or Growth)* by working with our state and organizational partners to establish a comprehensive framework for implementing a modular assessment approach. We address CPd *(Allowing for Collaboration among Organizations to Improve State Assessment)* by bringing together a group of five organizations (edCount, LLC, the Center for Assessment, the Learning Sciences Research Institute at the University of Illinois, Chicago, SRI International, and Creative Measurement Solutions, LLC) and an external evaluator (Garrett Consulting, LLC) to work with eight partner states (Nebraska as lead, along with Alabama, Alaska, Montana, New Mexico, New York, South Carolina, and Wyoming) in strengthening the quality, validity, and reliability of their assessment systems. We address CPe (*Using Multiple Measures of Student Academic Achievement*) by

developing prototype curricular units and flexible instructionally-embedded assessment tasks that can be administered at points within the school year for a variety of purposes to measure and assess student progress in terms of the state's academic standards. We address CPf *(Evaluating Student Academic Achievement through the Development of Comprehensive Assessment Instruments*) by not only developing a bank of "common" instructionally-embedded modular science assessment tasks and additional sets of classroom-based formative assessment tasks, but also creating a variety of tools and documentation to bolster a state's overall assessment system and approach.

SIPS addresses these Absolute and Competitive Preference Priorities in an integrated, coherent manner and, in doing so, honors the significant work that the US Department of Education, the National Science Foundation (NSF), and states themselves have already funded in support of high quality science assessment systems as well as targets validity as the critical, unifying, fundamental concept in assessment. With validity understood as a judgment of a body of evidence related to the interpretation and use of assessment scores (AERA APA, & NCME, 2014), we aim to build a means for states and their local education agencies to build and make effective use of stackable, instructionally-embedded, portable science assessment tasks.

Project Design

Establishing portable, high-quality, and culturally-relevant curriculum and assessment resources and building state and local educators' capacity to use those resources to implement effective science instruction and assessment are key project goals that will inform every design decision that is made throughout the project. Local teachers and administrators have much to contribute to this work: they know their students' most pressing academic needs, harbor expertise in the use of content-specific instructional strategies, and have experience working in

the community. Combined with their familiarity with the unique cultural practices and priorities of their region, local teachers and administrators are a natural go-to resource for developing culturally-relevant instruction and assessment materials for the students they teach (Allen, 2002; Mooney & Mausbach, 2008). We also know that the effectiveness of the curricular and assessment tools we develop depends on the capacity of educators to implement them. We plan to build local capacity by engaging educators in the development of the tasks and prototype curriculum maps and in the piloting of those resources. Throughout these processes, the SIPS team will teach educators about rigorous assessment design, the *Framework* and NGSS, best practices for three-dimensional science teaching and learning, and blended and remote learning.

Next, in preparation for our description of project organization and management, we describe the theory and research foundations for our proposed SIPS work.

Theoretical and Research Framework

SIPS has a well-grounded theoretical and research foundation. Here, we describe our science learning and assessment framework, measurement approach, curriculum development approach, and need for an on-line platform.

Science Learning and Assessment Framework

The *Framework* (NRC, 2012) presents a vision for three-dimensional science learning (Pellegrino et al., 2014) in which students are to make sense of phenomena or design solutions to problems using disciplinary core ideas, scientific and engineering practices and crosscutting concepts. Disciplinary core ideas (DCIs) represent the powerful ideas of the disciplines of Earth and space sciences, physical science, and life science, and are used in explaining a range of natural phenomena. For instance, the physical science DCI of *matter and its interactions* helps to explain what everything is made of and predicts why things happen in the natural world. Within

biology, *evolution* serves as a DCI that explains the diversity of life on Earth. Crosscutting concepts, such as *patterns*, *cause and effect*, *scale*, and *systems* are ideas that occur within and across disciplinary boundaries and have explanatory value throughout much of science and engineering. Patterns, for instance, exist everywhere and occur in biological, chemical, and Earth systems and scientists in all fields seek explanations for observed patterns as they make sense of phenomena. Scientific and engineering practices are the everyday ways of knowing and doing which scientists and engineers employ to study and explore the natural and designed worlds. Both scientists and engineers engage, for example, in the practice of *developing and using models*. Scientists use models to understand and explain phenomena; engineers use models to develop and analyze systems as well as develop and test designs. The *Framework* vision, derived from a rich research base on how students learn science (see, for example, NRC, 2007) puts forth that in order to learn science, you need to do science by making use of all three dimensions. It is making use of the three dimensions that reflects the knowledge-in-use perspective within the *Framework* and which guided development of the NGSS.

Accordingly, the NGSS expresses standards as *performance expectations* that integrate all three dimensions of science proficiency. Each NGSS performance expectation integrates a science or engineering practice, a disciplinary core idea, and a crosscutting concept into a single statement of *what is to be assessed* at the end of a grade level or grade band. It incorporates all three dimensions of knowledge-in-use by asking students to apply disciplinary knowledge and make connections to a crosscutting concept as they engage in a science or engineering practice to make sense of phenomena or design solutions to problems. For example, an NGSS performance expectation for middle school physical science that focuses on the important idea of chemical reactions is stated as: *Analyze and interpret data on the properties of substances before and after*

the substances interact to determine if a chemical reaction has occurred. Another performance expectation related to chemical reactions addresses different dimensions and is stated as: *Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.* In NGSS nomenclature, these are referred to as MS-PS1-2 and MS-PS1-5, respectively.

Performance expectations are complex and considered summative goals, and therefore need to be learned over time and through a sequence of carefully designed lessons and units. At the elementary level, students are expected to develop proficiency across the year; whereas at the middle and high school levels, proficiency is attained across the grade band. Given the multi-dimensionality of the performance expectations and their broad scope, it is no easy task for teachers to gauge student progress toward achieving them.

Learning Progressions in Science

Learning progressions are "descriptions of the successively more sophisticated ways of thinking about a topic that can follow one another as students learn about and investigate a topic over a broad span of time" (National Research Council, 2007). Learning progressions are based on available research about how learning develops over time, articulating progress toward grade-level standards in terms of the big ideas/enduring understandings and essential concepts/processes. Learning progressions are meant to support planning and modify instruction, develop meaningful assessments, and monitor progress (Hess and Kearns, 2010). They provide an ordered sequence for instruction that are intended to lead students to achieve a significant curricular outcome.

SIPS will build upon the science learning progressions developed using the Principled Design for Efficacy framework (Nichols, Ferrara, & Lai, 2015; Ferrara, Lai, Reilly, & Nichols,

2016). This framework, originally developed to support the design and development of a learning progression-based assessment and learning system in mathematics (Lai, Kobrin, Nichols, & Holland, 2015; Lai, Kobrin, DiCerbo, & Holland, 2017), has been extended to support learning progression-based assessment and learning in science. At the heart of this framework is the association of task and response metadata to the increasingly sophisticated knowledge and skills described in the learning progressions.

SIPS partners will use learning progressions for several key purposes throughout our development processes. They will inform the development of performance level descriptors and a yearlong curriculum planning framework at grades 5 and 8, which will serve as the foundation on which all curriculum materials and common assessments are developed. Its purpose is to describe the developmental progression, or continuum, of learning within and across grades toward college- and career- readiness to ensure that the academic standards are vertically articulated across units according to available research about how learning develops over time.

Principled Assessment Design Approach

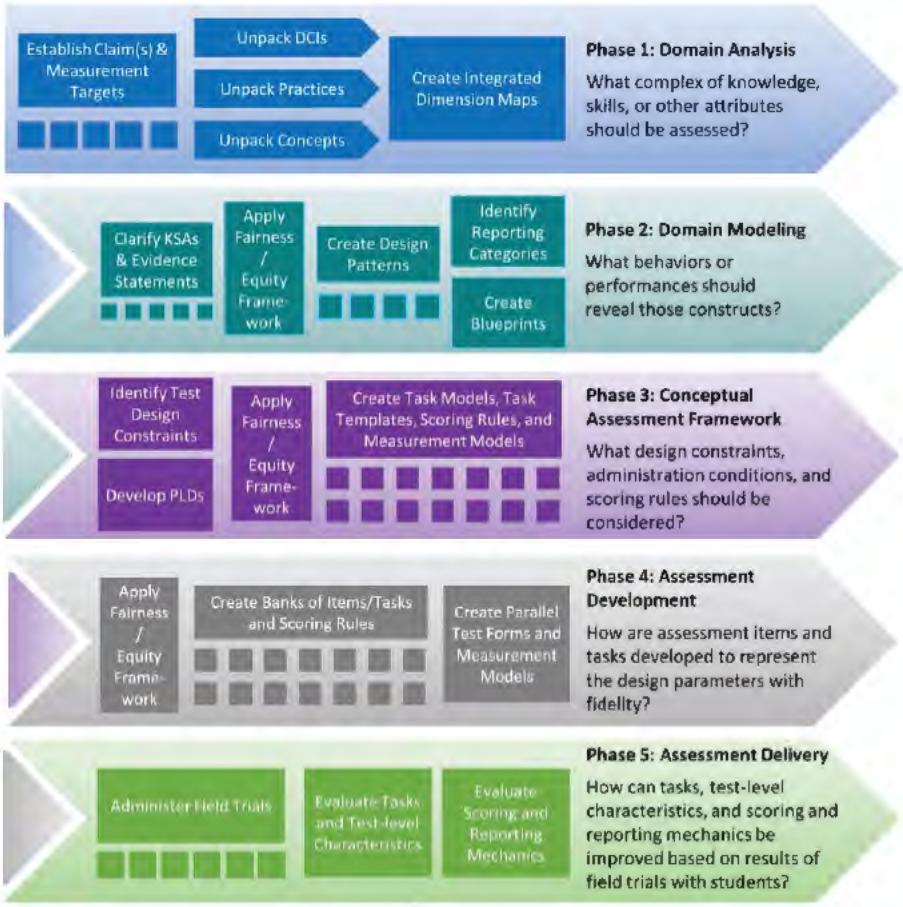
We will be extending prior work on the development and application of a principled approach for designing classroom-based assessments that provide teachers with meaningful and actionable information about students' progress toward the knowledge-in-use learning goals expressed by the performance expectations of the NGSS. Our approach draws from evidence-centered design (ECD) (Mislevy & Haertel, 2006), which has gained widespread attention as a comprehensive approach for principled assessment design and validation. ECD emphasizes the evidentiary base for specifying coherent, logical relationships among the (a) learning goals that comprise the constructs to be measured (i.e., the claims articulating what students know and can do); (b) evidence in the form of observations, behaviors, or performances that should reveal the

target constructs; and (c) features of tasks or situations that should elicit those behaviors or performances.

Performance expectations present new challenges for anyone involved in science assessment design (Pellegrino et al., 2014): *How do we measure the integration of the three dimensions? How can we design integrated assessment tasks in which students make sense of phenomena or design solutions to problems so that they provide evidence of 3-dimensional learning?* Additional challenges arise for those concerned with classroom-based assessment design: *How do we use performance expectations in order to construct assessment tasks that can be used during instruction? How can we design these tasks so that they help teachers gauge students' progress toward achieving the performance expectations?* Our approach to addressing both sets of challenges is to use principles of ECD (Almond, Steinberg, & Mislevy, 2002; Mislevy & Haertel, 2006) that have been used in wide-ranging assessment design contexts (e.g., National Center and State Collaborative, 2013; Partnership for Assessment of Readiness for College and Careers, 2014; Smarter Balanced Assessment Consortium, 2012). However, until recently, little work has been done on using ECD to design knowledge-in-use assessments for science classroom settings.

To address the goal of developing classroom-based assessment tasks for the NGSS, we use ECD to systematically unpack NGSS performance expectations and synthesize the unpacking into multiple components called learning performances. The term learning performance draws from the work of Perkins (1998) and his notion of understanding performances as opportunities for students to showcase understanding through thought-demanding ways. It has been used more recently in curriculum and assessment design (e.g., DeBarger, Penuel, Harris, & Kennedy, 2015; Krajcik, McNeill, & Reiser, 2008).

Exhibit 3. The Five-Phase Approach to Principled Assessment Design[3]



In our work, learning performances constitute knowledge-in-use statements that incorporate aspects of disciplinary core ideas, science practices, and crosscutting concepts that students need to be able to integrate as they progress toward achieving performance expectations. A single learning performance is crafted as a knowledge-in-use statement that is smaller in scope and partially represents a performance expectation. Each learning performance describes an essential part of a performance expectation that students would need to achieve at some point during instruction to ensure that they are progressing toward achieving the more comprehensive performance expectation. They collectively describe the proficiencies that students need to

[3] Adapted with permission from the SCILLSS project (SCILLSS, 2017c).

demonstrate in order to meet a performance expectation. The learning performances can be aligned with a larger learning progression.

We intend our tasks to be used flexibly by teachers during instruction and, accordingly, the tasks can be relatively short in duration, requiring anywhere from 5–15 minutes to complete depending on the requirements of particular tasks. Each task is anchored in a phenomenon and most are contextualized within a brief scenario. The tasks are technology-based and made available online through a web-based portal. Teachers select the tasks they would like to use from the online task portal and decide how they would like to use the tasks with their students. During the development of tasks, we build in specific technology enhancements, such as simulations and drawing tools, to support students in engaging with all three dimensions of the learning performance. The tasks are accompanied by rubrics designed to facilitate rapid scoring judgments to provide teachers with timely insights about their students' progress.

In developing, refining and applying this design process to multiple performance expectations from the NGSS we have been very cognizant of generalization and validation issues. The validation efforts have been guided by the framework presented by Pellegrino, DiBello, and Goldman (2016) for instructionally supportive assessments. That framework discusses three major components of validity for which systematic evidence should be sought above and beyond articulation of the ECD process: Cognitive, Instructional, and Inferential. For example, at each major stage in the process we conduct an independent review of the products of the domain analysis process by having science and science education experts review the integrated dimension maps and the learning performances derived from them. This includes the appropriateness of each designated learning performance and the adequacy of the set of learning performances with respect to representation and coverage of the domain. Based on feedback

from the experts we make revisions or clarifications as needed. We also have these same experts then review the tasks that we designed to align with each learning performance and their proposed evidence rules and scoring rubrics, again making refinements in response to feedback. Throughout the process we conduct an equity/fairness review to ensure that tasks minimize bias. Once we have tasks that have been through the expert review phases we further refine them using several steps, including (1) think-aloud sessions with students that examine whether tasks are comprehensible to them and whether they elicit three dimensional performance, (2) collection of classroom performance data to determine applicability and reliability of scoring rules using the rubrics, (3) application of measurement models to the scored data to examine item performance characteristics, and (4) classroom studies with teachers, who provide design feedback on tasks and help us consider the possibilities for formative use. More detailed discussions of specific validation activities and results can be found in several papers (e.g., Alozie, et al., 2018; Gane, et al., 2018; McElhaney et al., 2018; Zaidi et al., 2018).

Measurement Model

Given the need to design stackable, instructionally aligned NGSS assessment tasks—measures that provide feedback to teachers and students about the status of student science learning, we propose to investigate multiple approaches for the SIPS measurement model. The first is based on contemporary psychometric methods for modeling student learning based on evidence from multidimensional assessment tasks (Ackerman, Gierl, & Walker, 2003; Briggs & Wilson, 2003). Multidimensional item response theory modeling (mIRT), particularly the multidimensional Rasch model, will allow us to provide initial calibrations of task difficulty across students at each of the targeted grade levels. We also propose to explore methods from a

relatively new extension of principled assessment design based on Embedded Alignment & Standard Setting (EASS) methodologies (Forte, 2017; Lewis & Cook, 2020).

Both approaches rely on the development of learning progressions that guide the development of the task pool. The learning progressions will reflect a developmental continuum of performance expectations within and across grades and the articulation of performance level descriptors within and across grades. The application of the learning progressions to the design and development of the task pool is expected to result in a well-articulated set of tasks that fulfill a cumulative test blueprint with each component administered when it appropriately reflects the taught curriculum. Next, we briefly describe each approach—mIRT and EASS.

mIRT. mIRT, generally speaking, is a family of psychometric models that are useful for supporting the design and development of multidimensional assessments aligned to the NGSS (Reckase, 2009). These mIRT approaches to educational measurement hold a good deal of promise when the aim is to align closely instruction and assessment (Ackerman, 1992; Walker & Beretvas, 2006). For the NGSS aligned assessments of the kind proposed here, mIRT approach assumes that the tasks, by design, are assessing more than one dimension—indeed most will be designed to measures the three salient dimensions of disciplinary core ideas (DCIs), cross-cutting ideas (CCIs) and science and engineering practices (SEPs). Using the principled design approach to task design and development described earlier, we will augment the mIRT models (i.e., we are assuming model differences across grade levels) with additional information about the tasks' features as captured during the task design stage. Our aim is to identify which features of the assessment tasks contribute in instructionally meaningful ways to understanding students' science learning and, ultimately, to provide teachers with actionable diagnostic classifications of their students. By using a measurement approach that integrates descriptive analyses, classical

test theory methods (Crocker & Algina, 2006) and mIRT psychometric modeling techniques we are able to identify unique patterns of KSAs mastery and non-mastery and use the model-based ability estimates to inform both classroom level score reports as well as create richly descriptive student-level reports.

Because this integrated measurement approach is both confirmatory (e.g., confirming task difficulty parameters) and diagnostic, the design of the NGSS aligned tasks will require identifying, a priori, the measurement targets (i.e., the performance expectations) as well as the sets of KSAs underpinning student achievement. In this proposal those evidence identification processes will be specified early in the task design process by applying a principled assessment design method described earlier (e.g., evidence-centered design, Mislevy & Haertel, 2006). Moreover, within the NGSS instructional framework, tasks are comprised of a number of subtasks (or items), thus the assessment tasks are, by design, multidimensional. The task–KSA alignment as determined by the principled assessment design process will be captured and instantiated in a series of psychometric "explanatory" models. In this proposal the integration of the mIRT models and the task/item feature identification methods contribute to construct validity and ensure the accuracy of the inferences drawn about student learning and the instructional utility of the task specifications and feature. This measurement approach, we believe, is particularly attractive because the supplemented mIRT models present a psychometrically sound solution when multidimensional feedback is needed to improve alignment with instruction. We assume—the idea remains to be tested—that this modeling approach, informed by a science learning progressions framework, will work with a relatively constrained number of unique tasks at each grade-level and relatively small samples of students.

EASS. EASS methods will be used to (a) directly measure the KSAs students have demonstrated on each task, estimate cut scores used to place students in performance levels on each task, monitor and measure longitudinal growth over the school year, and support the development of well-articulated Performance Level Descriptors (PLDs). Under EASS, the development of each task is facilitated by the alignment of the task components with evidence statements within a given performance level. Thus, each task provides direct evidence for the achievement of specific KSAs described in the PLDs. Also, in developing the pool of aligned tasks, any deficiencies with respect to breadth, depth, and granularity of the PLDs becomes evident and can be remediated.

As an outcome of EASS, cut scores on each task can be estimated (Lewis & Cook, 2020), and longitudinal growth can be directly observed in terms of the PLDs across tasks taken over time. Because the reported results and cut scores on each task have relatively low reliability due to modest individual task lengths, we propose to explore methods for aggregating results over the year to estimate a cumulative score that supports more reliable summative scoring and reporting. One approach to providing a summative score using EASS is to identify longitudinal task profiles of students that reflect typical performance in each performance level. Thus, individual student's profiles may be associated with the "closest" profile and associated performance level.

If available, we propose to explore the use of external measures of the NGSS to support (a) population of the validity argument for tasks information at the time of administration and at the end of the year and (b) the identification of task profiles associated with each performance level. It is not clear that useful external measures are available, but if so, their application will enhance the validity and utility of the pool of tasks.

There are many challenges associated with identifying and applying appropriate measurement models to the performance assessments described here. We propose to investigate the two promising approaches outlined above and use the findings to make recommendations for practice and to the development of associated score reports.

Understanding by Design (UbD) and Universal Design (UD)

SIPS partners will develop a prototype curriculum framework based on Grant Wiggins and Jay McTighe's (2010) Understanding by Design (UbD) model. The UbD approach for curriculum development is known as "backwards planning," which begins with the desired results and works backwards to determine the assessment evidence and learning plan. This approach ensures that teachers are deliberately planning their lessons with a focus on the expected objectives of what students should know and be able to do at the end of each unit. Coupled with the UbD approach, SIPS partners will apply principles of Universal Design for Learning (UDL) and PAD. UDL is a set of principles for curriculum development that provide all students with equal opportunities to learn. Because schools comprise a diverse body of learners who all bring unique skills, needs, and interests to their classrooms, UDL is a way in which educators can ensure that individual student needs are met through classroom-based instruction. Through the use of flexible instructional materials, techniques, and strategies a curriculum designed with UDL in mind will assist teachers in differentiating instruction to ensure that the greatest number of students can access the NGSS-based curriculum and assessments. SIPS partners will also apply PAD based on evidence-centered design established by the SCILLSS and NGSA projects to design the instructionally-embedded common assessments and other types of assessments (diagnostic, formative and summative) designed for classroom use to complement and inform science instruction and learning.

To support curriculum mapping, we will build a year-long framework to ensure coverage of all of the grade-level performance expectations. SIPS partners will use four yearlong planning tools to establish the framework for each grade level or course curriculum: the end-of-year student profile, quarterly student profiles, the curriculum alignment tool (CAT), and the pacing calendar. The end-of-year student profile is a description of what students should know and can do at the culmination of year-long instruction at each grade level or course. It provides a means for ensuring the vertical articulation of concepts and skills across grades towards college- and career-readiness. Quarterly student profiles provide a means for ensuring a developmental progression, or continuum, within each grade. They are based on available research about learning progressions, or how learning develops over time within a discipline, and are developed by mapping backwards from the end-of-year student profile at each grade. The CAT is a matrix that shows how performance expectations are mapped across units in each grade level or course. This tool is useful in ensuring coverage of the PEs across the school year and illustrating appropriate spiraling of these PEs across units. It is developed to align with the learning outcomes described in the quarterly and end-of-year student profiles. Finally, the pacing calendar outlines the sequence, length, and title of each science unit for each grade level/course.

SIPS partners will build learning progressions into all year long planning tools and will also use learning progressions to inform the development of assessment tasks and guidance to teachers and parents on how to use interpretations of student performance to improve or modify instruction. By linking learning progressions to student performance within the curriculum planning tools, maps and assessments, teachers and parents will receive specific guidance to help students progress along a clearly defined learning continuum.

The maps will be organized into three stages, aligned with the UbD framework: stage 1–desired results, stage 2–assessment evidence, and stage 3–learning plan. Stage 1, the desired results, provides the expected learning outcomes of the unit. This includes: 1) the performance and learning expectations covered in the unit; 2) major concepts and questions that students will explore; and 3) the breakdown of specific content knowledge and skills students need in order to master the learning expectations. Stage 1 outlines what students should know and be able to do by the end of the unit. Stage 2, the assessment evidence, describes the means of assessing the concepts, knowledge, and skills from stage 1. This includes: 1) summative assessments such as projects, experiments/labs, performance tasks, and unit exams that occur at the conclusion of a series of lessons; and 2) formative assessments such as, graphic organizers, models, and journal entries that should occur on an ongoing basis during the unit. Stage 2 explains how teachers evaluate the level of student understanding based on the information taught. This section of the curriculum maps makes a direct connection between the learning expectations and content to be delivered in a unit and the ways in which students and teachers can evaluate learning and mastery of those expectations. The curriculum maps offer embedded links to the diagnostic pre-assessments, formative assessments, and summative assessments that generate data to inform instructional planning. Stage 3, the learning plan, outlines a road map for instruction, including lesson plans, activity ideas and supporting resources. Stage 3 describes the steps students should follow to acquire the content and/or skills identified in the objectives for the unit.

Web-Based Platform for Delivery

In the last three decades, the use of technology to support education has become ubiquitous. Well-supported and contextualized electronic applications such as a web-based resource center for educators can present numerous benefits including more equitable access to professional

development opportunities and incentives for formal and self-organized learning activities (Schlager & Fusco, 2004), an increased sense of community for educators (WBEC, 2000), and greater access to experts and archival resources that are typically limited by fiscal and logistical constraints (Dede, Ketelhut, Whitehouse, Breit & McCloskey, 2009). In addition, a web-based resource center ensures that curriculum and assessment materials are available to all teachers in a centralized location facilitating the collaboration and communication among teachers to share best practices and useful resources. While creating a fully-functional platform is necessarily beyond the scope of the SIPS project, we proposed to design the architecture necessary to build such a platform. This will allow state partners to self-determine how best to meet their needs through modifications of their existing platforms or commissioning new ones.

Project Organization

The SIPS project is designed to address three main objectives: 1) establish a bank of instructionally-embedded, science assessment tasks aligned with an actionable performance scale; 2) build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and 3) engage educators, students, and parents in a partnership for student success across a range of circumstances. To address these three objectives, SIPS partners will produce the following deliverables, which can be used beyond the project states: claims, measurement targets (MTs), and PLDs; end-of-year/course and quarterly student profiles and progressions; curricular alignment tools; curriculum unit templates; instructionally-embedded common assessment tasks; year-long model courses (~4 units) aligned to phenomena and NGSS thematic or topics bundles; process guides articulating the design approach and process (UbD and PAD); and quarterly reports, annual reports, and a culminating project report.

SIPS is organized into six tasks that contribute to the development of these deliverables and make up the scope of work described in this proposal.

Task 1: *Project Planning and Research (~36 Months, Ongoing)*

Objective: To ensure that the project is managed appropriately to support engagement, effectiveness, and responsible stewardship of federal, state, and local resources. In addition, to guide state partners to create a common project validity evaluation framework and assessment system Theory of Action (ToA) that can be applied to the subsequent project tasks. (AP3, CPd)

At the start of the project, SIPS partners will develop project management tools including timelines with defined deliverables, an invoicing schedule, an external oversight plan, a communication plan, a staffing plan, and contractual agreements.

1.1 Project kick-off meeting. Within six weeks of grant award, the full project team, including all state and organizational partners, will convene a virtual, two-day kick-off meeting with state and organizational partners. The purpose of this meeting will be to review the project goals, tasks, and timeline, and to allow project participants to get to know each other and learn about the partner states and organizations.

1.2 Biweekly management meetings. The SIPS organizational partners will meet biweekly to discuss project management issues (e.g., contracts and budgets), monitor progress toward project goals, activities, and deliverables, and identify and address anticipated or actual workflow, personnel, or budget issues. These meetings will be facilitated by the project director, and the outcomes will support the seamless achievement of project goals, activities, and deliverables within the timelines and budget of the project.

1.3 Monthly planning meetings. Each month, the full project team, including state representatives and organizational partners, will meet to provide updates on progress toward

project goals, activities, and deliverables. These meetings will provide a forum in which states can share updates and ideas regarding the development of project outcomes and troubleshoot issues as they arise.

1.4 Annual project meetings. Once annually in years 2 and 3, the full project team, including state representatives and organizational partners, will convene a virtual, two-day Zoom meeting to share project-related information and to engage in mutual learning opportunities in working collaboratively toward project outcomes.

1.5 Web-based collaboration tools. We will use Box, a web-based content management tool, to construct an online workspace for all project staff to use in managing the various tasks of the project. Box will include a password-protected workspace and will allow the transfer of secure content among all project partners and contributers. SIPS partners will also create and monitor work plans within SmartSheet. This digital project tracking tool will provide transparency of process, roles, completion of tasks, and progress toward delivery, allowing project leaders to regularly evaluate project status by team member, phase, or deliverable.

1.6 SIPS project website. SIPS partners will develop and maintain a website through which the SIPS project will communicate with the public and education stakeholders to share all generalizable resources developed by the project for use beyond the project states, including the curriculum maps, assessment tasks, summary briefs, and annual and culminating reports. Our team will maintain the project website for a minimum of five years after the completion of the 36-month active project period.

1.7 SIPS Web-based platform. SIPS partners will prepare specifications for a web-based platform for the storage and delivery of the SIPS curriculum maps, instructional resources, and science assessment tasks. The open-source platform design will serve a variety of functions, such

as serving as a repository for storing curriculum materials and assessment tasks, accommodating web-based item authoring using a principled-design approach, and offering mechanisms for task administration, scoring and reporting.

1.8 Develop project ToA and validity evaluation framework. SIPS partners will develop a common ToA for the project that delineates the overarching project vision and priorities as applicable to all participating states, and a generalizable validity evaluation framework. Our team will gather documentation from states to collectively revise the ToA in an iterative manner for state examination. State representatives and organizational partners will come to consensus on a common vision for addressing validity issues as part of assessment design and development and for gathering and evaluating validity evidence in support of meaningful, useful assessment scores. The common ToA will serve as a starting point for discussions with states about their specific assessment types and contexts.

Task 2: *Claims, Measurement Targets, PLDs, and Curricular Planning Tools and Templates (~5 Months, Spring 2020-Summer 2021)*

Objective: To articulate common construct definitions based on three-dimensional, framework-based standards that drive curriculum, instruction, and assessment decisions at the local and state levels and develop a framework for designing curriculum maps and common assessments aligned to the NGSS bundles. (AP3b, CPb)

Our activities for Task 2 take into account the commonalities across participating states' three-dimensional science standards, instructional priorities, and assessment systems to inform the development of two sets of claims, MTs, and performance level descriptors, one each at grades 5 and 8, to offer common construct definitions to guide Task 3 work. This approach will

ensure that Task 2 outcomes have maximum relevance for participating states, but also the generalizability to other states facing or actively working through their own transitions.

2.1 Develop claims, MTs, and PLDs. SIPS partners will identify commonalities and differences across states as well as commonalities and variations across grades to identify two sets of prioritized claims—broad statements about what assessment scores mean in relation to the NGSS performance expectations—to guide the Task 2 work. Using these prioritized claims, SIPS partners will develop for each claim at grade 5 and grade 8: a set of MTs and a set of PLDs. The MTs will describe a set of knowledge, skill, and competency expectations derived from a set of performance expectations to inform curriculum and assessment (item and test) development procedures and will determine what the assessment scores are meant to reflect. The PLDs will define the characteristics of least sophisticated to most sophisticated performances along the score scale that will be used to inform assessment design (i.e., the items and sets of items on which scores are based) as well as to report assessment performance.

Once drafted, the project director will provide the claims, MTs, and PLDs to state partners and expert panelists for review and feedback using the project Box site. Following this review, SIPS partners will apply revisions to the materials based on the gathered feedback. At this stage in development, the project director will facilitate a virtual meeting with the full project team to provide states an opportunity to collaborate to review and approve the materials.

2.2 Develop year-long curriculum planning tools and templates. In preparation for Task 3, SIPS partners will develop UbD curriculum map templates and common assessment templates with input from state representatives and expert panelists using an iterative design process and by incorporating multiple internal and external reviews. All templates will be finalized and

approved by state partners prior to initiating development of the prototype science curriculum and common assessments (see Task 3).

2.3 Facilitate state and expert reviews of draft components. SIPS partners will employ an iterative and collaborative process to all Task 2 activities. Our team plans to revisit and refine the claims, measurement targets and PLDs on an ongoing basis to ensure strong alignment between the learning framework and all curriculum, instruction and assessment resources. SIPS partners will also provide multiple opportunities for state partners and expert panelists to review the claims, measurement targets, PLDs, and curricular planning tools and templates and provide feedback using the project Box site. Following each review, SIPS partners will apply revisions to the materials based on the gathered feedback and facilitate virtual meetings with the full project team, as necessary, to reconcile feedback and provide states an opportunity to collaborate to review and approve the materials.

Task 3: *Prototype Curriculum Framework (~23 Months, Spring 2021-Fall 2022)*

Objective: To apply Understanding by Design, Universal Design for Learning, and Principled Assessment Design to develop prototype science units with common, instructionally-embedded assessments aligned to the NGSS bundles at grades 5 and 8. (AP3a, AP3b, CPb, CPd, CPe, CPf)

3.1 Educator recruitment and training. During year 1 of the project, SIPS partners will collaborate with partner states to recruit diverse groups of educators from across the partner states to serve on curriculum and common assessment development teams at grades 5 and 8. Each educator will contribute to curriculum and/or common assessment development activities by attending a series of comprehensive trainings on a variety of topics, including, but not limited to: UbD, UDL, PAD, the NGSS and the Framework, selecting quality phenomena and design problems, cultural relevance, and instructional and item writing best-practices. Following the

trainings, SIPS partners will lead educators through a highly-structured design process for the development of eight prototype curriculum maps and eight common assessments, four of each at grades 5 and 8. Educators will attend virtual collaborative development meetings, gather resources and ideas, and serve as lead writers and key contributors to all development activities.

3.2 Develop UbD Curricular Units and Common Assessments. SIPS partners and collaborating educators will employ UbD, UDL and PAD to develop the prototype curriculum maps and common assessments at grades 5 and 8. The common assessments will measure the knowledge, skills and abilities expected of students after each quarter of instruction as specified by the learning and curriculum frameworks (see Task 2). SIPS partners will collaborate with educators to develop a full suite of design tools (unpacking tools, task specifications templates), tasks, rubrics, and exemplar responses at each grade band.

3.3 Conduct Internal and External Reviews. Curriculum and assessment development will be collaborative and iterative, involving multiple stages of development and a range of key contributors, both internal (state representatives, organizational partners, and expert panelists) and external (local educators, parents/guardians, students, and community members) to the project. By incorporating stakeholder input and feedback at key junctures in the development process, SIPS partners will ensure that the prototype curriculum and common assessments reflect the wide representation of teachers, schools, and cultures into which it would eventually be implemented. SIPS partners will conduct a variety of virtual Zoom meetings with various stakeholders for a myriad of purposes, including initial conceptualization, design and development, internal and external reviews and reconciliation of feedback, and verification and finalization of materials. SIPS partners will use criteria to guide all review activities, including the NGSS EQuIP Rubric for Science, NGSS Task Screener, UD accessibility and fairness

criteria, content accuracy criteria, and overall quality assurance criteria. All reviews will be thoroughly documented and made available to project partners via a secure Box site.

In terms of external reviews, SIPS partners will work closely with state representatives to organize two public review and comment periods in our eight partner states, one in Spring 2022 and another in Summer 2022. The public reviews will gather important feedback from diverse stakeholder groups (i.e., local and state educators, parents/guardians, students, and community members). Following the public reviews, SIPS partners will reconcile all feedback in with state representatives and apply agreed-upon refinements to the materials prior to piloting.

3.4 Finalize Curricular Units and Common Assessments for Pilot Study. Prior to the pilot study (see Task 5), SIPS partners will finalize all curriculum and common assessment materials for dissemination to pilot study participants. Once the pilot study is complete, SIPS partners will review the results and apply additional refinements to the materials as necessary. Resources will be finalized and posted to the SIPS website in the final project year.

3.5 Document Processes. SIPS partners will develop one summary report to document a generalizable process for states to develop curricular maps and common assessments following the SIPS design approach. SIPS partners will summarize the overall process and the approach and criteria that guided the work to support replicability, scalability, and sustainability.

Task 4: *Classroom Assessment Development Workshops (10 Months, Fall 2021-Summer 2022)*

Objective: To engage educators to develop a bank of formative, multi-dimensional science assessment tasks at grades 5 and 8 using a principled-design approach.

4.1 Facilitate virtual workshops with state and local educators. SIPS partners will collaborate to plan and facilitate two, five-day virtual professional learning workshops and follow-up meetings with approximately 40 educators from across the SIPS partner states to apply

PAD to develop a bank of 40 classroom science assessment design templates (unpacking tools, task specifications tools), tasks, rubrics and exemplar responses (20 each at grades 5 and 8). The workshops will strengthen educators' understanding of classroom-based assessments and their purposes and uses in a standards-based system and provide a process and tools to strengthen educators' ability to design classroom science assessments that support instruction aligned to the NGSS.

4.2 Evaluate tasks and provide feedback to educators. To ensure the tasks developed during the virtual workshops are properly vetted and of high quality, SIPS partners will engage participating educators in an iterative development process. Following the workshops, SIPS partners will review the design tools, tasks, rubrics and exemplar responses using the NGSS Task Screener and will provide detailed feedback to educator teams to inform further revision to the materials. SIPS partners will schedule and facilitate a virtual meeting with each educator development team to share task feedback and offer guidance to inform revisions to the tasks. SIPS partners will also conduct detailed bias/sensitivity, accessibility and fairness, and content accuracy reviews for all tasks and will ensure proper compliance with all copyright/licensing terms of permissioned materials (stimuli, images, diagrams, graphs, etc.) to ensure that all final tasks can be widely disseminated and made available to all stakeholders.

4.3 Finalize design tools, tasks, rubrics and exemplar responses. Following the task feedback meetings, educator development teams will apply revisions to the classroom assessment design tools and tasks, as necessary, and will submit the tasks for finalization. SIPS partners will copyedit and format the tasks in preparation for wider dissemination via the project website, and eventually, through an online platform or repository.

Task 5: *Pilot Study of Curriculum Prototypes and Common Assessments (25 Months, Fall 2021-Summer/Fall 2023)*

Objective: To engage districts and local educators in piloting the prototype curricular units and common and formative assessments at grades 5 and 8 to gather feedback regarding the quality and usefulness of the resources and recommendations for making improvements. (AP3a, AP3b, CPb, CPd, CPe, CPf)

5.1 Develop pilot study timeline, process, criteria and protocol. SIPS partners will collaborate to develop pilot study timelines, processes, criteria, and protocols to support the evaluation of the following materials at grades 5 and 8: the prototype curricular units and common instructionally-embedded assessments administered throughout the year that are stackable and modular so as to support annual (end-of-year) assessment results; and standalone formative assessments that support instructional decision-making. The data collected from the pilot study will be used to: (a) gather feedback regarding the quality and usefulness of these assessment resources; (b) gather recommendations for making improvements to curricular units and assessments; and (c) support the evaluation of the measurement models under consideration (described in the *Measurement Model* section).

5.2 Recruit participating educators. The pilot study will elicit (a) information on the quality and usefulness of the resources and recommendations for making improvements, and (b) quantitative data on student responses to assessment tasks. To support the goal of random stratified sampling and also be flexible, SIPS partners will provide assignments of schools and grades that meet the stratification criteria in the order resulting from random assignment and ask states to select classes from schools in in the order provided, understanding that they may need to select teachers from alternate schools (also ordered by random assignment). States will use their

internal resources to identify teachers that are willing to, and are most qualified to, support the pilot study. We will encourage state partners to identify teachers with strong subject matter expertise in the NGSS as well as with an eye toward gender, ethnic, and other important teacher-attributes to result in a sample that is balanced both on school and teacher demographic attributes. We discuss teacher recruitment for the instructionally-embedded assessments, which stack to support annual reporting, and for the formative assessments, which are used to support instructional decision-making, next.

Stackable instructionally-embedded assessments to support annual reporting. The prototype curricular units and instructionally-embedded common assessments administered throughout the year (and which stack to support annual results) are supported by the measurement models described in the *Measurement Model* section. We will recruit educators from across partner states to support the associated data requirements. As such we propose a school-based sampling approach as the foundation of the pilot study for these assessments. We propose to sample three schools in each state, three teachers per state (24 teachers in all), and 600 students. The recruitment of pilot participants for the instructionally-embedded, stackable assessments will be based on stratified random sampling, when possible, given the constraints of states to support this model. Strata will include important demographics such as geographic region in a state, community type, school socio-economic status, and school size.

Formative assessments to support instructional decision-making. We propose a separate sample of teachers to evaluate the quality, and make recommendations for the improvement, of formative classroom assessments (see Task 4). The piloting of the formative assessments will be process-oriented, and we will not collect student data. Therefore, we can broaden the sample of teachers piloting formative assessments to include a minimum number per state while opening

the formative pilot study up to other teachers in each state who volunteer to participate. That is, we require a sample of teachers reflecting demographics important to each state (geographic region, community type, school socio-economic status, school size) that will form the minimum sample. Other teacher-volunteers may participate in online training for the use of the formative assessments and in data collection, which will be by survey as well as videoconferencing.

5.3 Develop pilot materials and data collection tools. Working closely with content developers and technical experts, SIPS partners will (a) assemble the pool of stackable common assessments and formative assessments for online administration and/or distribution, (b) develop educator and student surveys that elicit responses associated with the quality of the materials as well as recommendations for their improvement, and (c) develop focus group scripts and protocols. Surveys will include selected response, rating scale, and constructed response items. Based on the results, a subsample of teachers will be selected for videoconference interviews to elicit more in-depth evaluations of the materials. Online surveys will be constructed to understand how well the materials reflect the intended curriculum, the clarity and appropriateness of the materials, any challenges the participants had in using the materials, and to elicit recommended improvements in the materials.

5.4 Plan for and facilitate orientations, trainings, and meetings to support implementation. SIPS partners will plan for and facilitate orientations, trainings, and meetings prior to and throughout the pilot study period to support curriculum and assessment implementation. After teachers are recruited to support the pilot study we will develop training materials and conduct multiple training sessions differentiated to support the stackable instructionally-embedded units, common assessments, and formative assessments. Each type of

training will be conducted several times in order to support the broadest participation by teachers in training in real time.

5.5 Gather, analyze and summarize pilot study results. Several different databases will be created including: (1) data at the school or district level—likely at the teacher level containing teacher-level reports of curriculum implementation, teacher attitudes and survey results; (2) student-level data containing performance scores on all NGSS tasks, prior achievement or other background data, student survey responses; and (3) a task-based database containing the task or item features, KSAs and other construct-relevant attributes.

Each of these databases will be created to support a series of specific analyses (e.g., analysis of teacher and student surveys). SIPS partners will include data analysis to format the data for each database and conduct associated analyses. The results will be assembled in a format to support the review of pilot study results with subject matter experts as they consider modifications to materials based on the results. Analyses will include testing of the proposed measurement models to support the development of an actionable performance scale for the stackable instructionally-embedded assessments.

5.6 Refine and finalize the curricular units and common assessments. Pilot study results will be used to refine and finalize the curricular units and common assessments at each grade. SIPS partners will participate in a review of the pilot study results by grade or grade band and will be supported by both subject matter experts and psychometricians to help fully understand the nature of the data and how it should be interpreted. Subsequent work by subject matter experts will document changes to materials and how such changes were informed by the pilot study results.

Task 6: *Project Evaluation, Dissemination, and Reporting (~36 Months, Ongoing)*

Objective: To develop a dissemination plan to share lessons learned and best practices from the project, to develop psychometric models that support the instructional and summative purposes of the SIPS evidence, and to provide useful reports to the field and to our grantor, ED. (AP3c)

6.1 Develop quarterly reports, annual reports, and culminating reports. In addition to the kick-off meeting (considered part of management meetings in Task 1 and our participation in related events convened by ED), the external evaluator will develop 12 quarterly reports and manage the development of two annual reports and one culminating report. These reports will ensure that all stages of the project are well documented for inclusion in the final report.

6.2 Develop dissemination plan. Our proposed external reporting activities are designed to promote scalability within and beyond project states by informing practitioners and researchers about project processes and products. We will design the dissemination plan around four major components:

1. Production of project reports and other resources that are well-organized, highly accessible to a broad range of users, and designed to facilitate sound interpretation and use in other states;
2. Maintenance of the project website for a minimum of five years after the completion of the 36-month active project period to facilitate public access to project resources;
3. Involvement of participating states and project staff in ED-sponsored meetings and events to share progress and outcome reports with ED and other nonparticipating states; and
4. Involvement of SIPS partners and states in public meetings, national conferences, and peer-reviewed journal articles, as appropriate, to share project progress and outcomes.

Project staff will monitor the websites of Association of Test Publishers (ATP), AERA, NCME, Council of Chief State School Officers, National Conference on Student Assessment

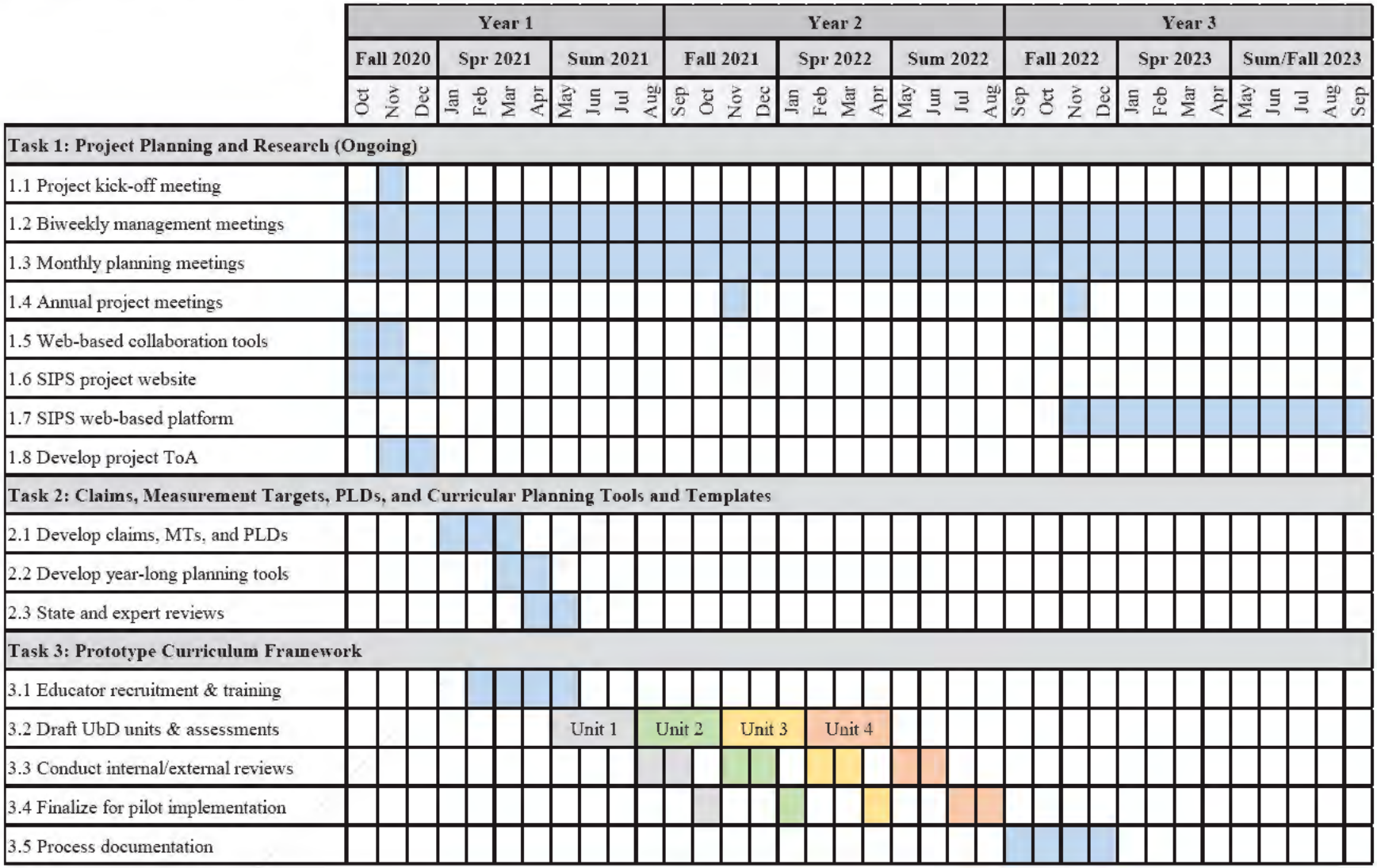
(CCSSO NCSA), and other relevant organizations to identify opportunities to share information about the SIPS project. We anticipate conducting a total of eight conference presentations (two in year 1 and three each in years 2 and 3) and preparing up to three articles during the active phases of the project. The outcomes for Task 6.2 are the dissemination of high quality technical assistance and research documents highlighting procedures, instrumentation, and results designed to be replicated in other venues.

6.3 Develop measurement models that support the instructional and summative purposes of the SIPS evidence. As described in the *Measurement Model* section, SIPS partners will investigate two promising approaches to developing a measurement model for the stackable NGSS performance assessments. After investigating these two approaches, we will use the findings to make recommendations for practice and to support the development of associated score reports. While the documentation of findings and recommendations for this aspect of the work comes near the end of the SIPS project, our psychometric experts will explore these methods throughout the project and will meet with project staff to ensure that their work is informing project development.

Project Timeline

Time is of the essence for educators, students, and parents; thus, our proposed timeline (see Exhibit 4) spans 36 months from the time of grant award. This is an ambitious timeline for this scope of work, but the long-time collaborative histories among our partners and individual project staff, as well as our combined expertise in implementing large, complex assessment and instructional design projects, provides the credibility necessary to plan such an aggressive approach. We are experts in how to do the work we have described and have track records that support our claims regarding the quality and timeliness of our services and project deliverables.

Exhibit 4. SIPS Project Timeline[4]



	Year 1											Year 2											Year 3											
	Fall 2020			Spr 2021				Sum 2021				Fall 2021				Spr 2022				Sum 2022				Fall 2022				Spr 2023				Sum/Fall 2023			
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Task 4: Classroom Assessment Development Workshops																																			
4.1 Facilitate virtual workshops																																			
4.2 Evaluate design tools/tasks/rubrics																																			
4.3 Revise/finalize tools/tasks/rubrics																																			
Task 5: Pilot Study of Curriculum Prototypes and Common Assessments																																			
5.1 Develop pilot study timeline/plan																																			
5.2 Recruit participating educators																																			
5.3 Develop materials/data collection tools																																			
5.4 Administer pilot study																																			
5.5 Analyze/summarize study results																																			
5.6 Refine/finalize the curricular units																																			
Task 6: Project Evaluation, Dissemination, and Reporting (Ongoing)																																			
6.1 Quarterly/annual/culminating reports			Q			Q			Q			Q/A			Q			Q			Q			Q/A			Q			Q			Q		Q/C
6.2 Develop dissemination plan																																			
6.3 Develop measurement models																																			

[4] The SIPS timeline is organized by typical school year periods (fall. spring. and summer) rather than quarters in order to better align with state partners' plans.

Project Services

The Nebraska Department of Education (NDE) along with project partners will take all steps necessary to ensure equitable access to, and participation in, the services provided through the project for all stakeholders, including state and local administrators, teachers, parents, and students who are members of groups that have traditionally been underrepresented based on race, color, national origin, gender, age, or disability. NDE and the project's state and organizational partners fully support Equal Employment Opportunity and Affirmative Action principles, practices, and programs, and do not discriminate among applicants or employees on the basis of gender, race, national origin, color, disability, religion, political affiliation, marital status, veteran status, or age. Applicants or employees capable of performing the duties of a position or job classification may not be discriminated against because of a physical or mental disability.

NDE and its project partners will ensure equal access and treatment for project participants who are from traditionally underrepresented groups. Project staff will ensure that the materials and resources are accessible to all stakeholders including those with disabilities and English learners by complying with Section 508 of the Rehabilitation Act of 1973 and the Web Content Accessibility Guidelines 2.0 (WCAG 2.0) set forth by the World Wide Web Consortium's Web Accessibility Initiative. All materials developed through this project will be internally reviewed using the built-in accessibility checkers in programs such as Microsoft Word and PowerPoint and checklists created by the US Department of Health & Human Services[5] to identify any issues with, but not limited to, the order of content, contrast ratios and uses of color, and the inclusion

[5] Making Files Accessible (n.d.). In *US Department of Health & Human Services*. Retrieved June 1, 2020, from https://www.hhs.gov/web/section-508/making-files-accessible/index.html.

of alternative text. Materials will also be reviewed by participating states and national experts for bias/sensitivity and accessibility. In addition, materials developed through this project will be made available in multiple forms to accommodate accessibility needs. Project staff will disseminate all materials in formats that comply with Section 508 on the project website, which will be developed and maintained in conformance with Section 508 and WCAG 2.0. Thus, the project's development efforts will deliberately address equitable access and participation by all students, teachers, and other program beneficiaries.

We will ensure full accessibility to meetings, project deliverables, communications, and other project activities. Special accommodations for participants with all types of disabilities, will be made so that educators and state personnel can fully participate. For example, face-to-face meetings will be held at venues that are fully accessible. This includes providing interpreters for staff, partners, and stakeholders who may have disability or English proficiency needs. In addition, all project tools, resources, and relevant information will be made publicly available online via the project website, which will be in a format that meets a government or industry-recognized standard for accessibility. Website developers will ensure full accessibility by building it into the project website's code and performing manual testing before publishing new content using testing methods and tools provided on section508.gov and will consider the use of an automated testing tool to scan for compliance. Project staff will ensure the project website and all website content conform to Section 508 and WCAG 2.0.

We will engage diverse groups of people in the development and implementation of project activities and in recruitment and retention of participants in the partner states. People with minority status, whether based on gender, race, national origin, color, disability, or age, will be encouraged to participate. Training and professional development for personnel will be available

to promote sensitivity and awareness to students with diverse learning needs and to create a supportive climate that fosters authentic engagement of participating teachers and other project stakeholders.

Procedures will be in place to ensure equitable access to and participation by school administrators, teachers, and parents from diverse groups that represent our state members' widely varying demographic and cultural profiles. School administrators, teachers and other stakeholders with minority status, whether based on gender, race, national origin, color, disability, or age will be encouraged to participate. Other unforeseen barriers to full access may be identified as the project gets underway, and NDE and project partners will address those barriers as they arise. Within contractual service agreements, NDE requires all entities to encourage applications from underrepresented groups and to identify strategies for doing so.

Adequacy of Resources

SIPS partners are a unified team with a decade-long track record as substantive collaborators for complex and challenging projects. Dedication to this project from all SIPS partners, its goals, and outcomes is clear in the letters of commitment and understanding from each state and organization (see the Letters of Commitment and Understanding attachment to the submission). Our collective partners include many of the most prominent thinkers today across multiple disciplines including principled-design, measurement, assessment literacy, and classroom practices, many of whom hold positions of great influence on the field. Our state partners, edCount, the National Center for the Improvement of Educational Assessment, Learning Sciences Research Institute at the University of Illinois-Chicago, SRI International, Creative Measurement Solutions, LLC, and Garrett Consulting have built their capacities through "distance" partnerships, from development through implementation and dissemination of

conceptually and practically complex and challenging projects. We understand that the successful completion of this project, given the location of our state partners, depends on the appropriate leveraging of technology, management structure, and collaborative communication tools.

While each partner organization has a "home base or office," most staff work remotely and telecommute except as necessary to meet in-person. Given this organizational structure, our proposed resources are adequate and appropriate to conduct the work in remote locations across the country. On a daily basis, staff from each of the partner organizations virtually manage and achieve project and contractual obligations with ease. As the lead organizational partner, edCount has the necessary office equipment along with adequate office space at our central location to support administrative staff for the project.

Capacity of State and Organizational Partners

Collaborative partnerships among SEAs, external experts, consultants, and learning communities can help improve the organization and outputs of SEAs (Unger et al., 2008). By joining a consortium, or collaborative, such as SIPS, states have increased access to leading experts in the field, develop beneficial and long-lasting partnerships that can lead to future endeavors, and benefit from tools, resources, and enhanced expertise they can use to meet the needs of their own state plans and timelines.

All five of the SIPS organizational partners have established excellent national reputations for the type of work in which SIPS will engage them. These organizations have each built their capacities through a variety of partnerships with SEAs, LEAs, universities, and other entities and have well-established track records of success for development, implementation, and dissemination of complex and challenging projects. They have highly developed infrastructures

for communication, teleconferencing, networking, and other distance technologies and understand that both technology and communication are critical in high level collaborative partnerships.

This partnership not only leverages individual and organizational excellence for SIPS but represents true diversity by directing 52% of the sub-contract value to small businesses and 44% of this to a woman-owned small business.

We also pledge to create meaningful opportunities for persons from traditionally underrepresented groups, including those with disabilities, in the employment of project staff and experts, in the composition of our state members' widely varying demographic and cultural profiles, and involvement of teachers, parents, and others in stakeholder groups from design to implementation. We will provide the accommodations needed for full participation including interpreters for staff, partners, and stakeholders who have disability or English proficiency needs. We will ensure the project website will include relevant information and documents in a format that meets a government or industry-recognized standard for accessibility and fairness.

edCount, LLC, is a federally registered woman-owned small business and a certified Woman-owned Business Enterprise. Since its founding in 2003, edCount has provided direct or advisory services to all 50 states and seven US territories. edCount staff have extensive experience assisting SEAs and LEAs with designing, developing, and evaluating their assessment systems and technical documentation; providing professional development; conducting external and ED reporting; and coordinating multi-state collaborative groups. edCount is a lead vendor on SCILLSS, an EAG project dedicated to science assessment development for local and large-scale assessment purposes. The American Education Research Association (AERA) recently recognized SCILLSS products as the first place winner of the

AERA 2020 Division H's Outstanding Publications Competition in Category 4: Assessment & Accountability. The award is a testament to the significant contributions that SCILLSS has made in developing assessment system evaluation protocols and an accompanying digital workbook.

The National Center for the Improvement of Educational Assessment, Inc. (The Center for Assessment) is a Dover, NH based not-for-profit (501(c)(3)) corporation. Founded in 1998, the Center's mission is to improve the educational achievement of students by promoting improved practices in educational assessment and accountability. The Center for Assessment does this by providing services directly to states, school districts, and partner organizations support state and district assessment and accountability systems. The Center pursues the dissemination of best practices through their annual conference, through extensive work with state TACs, through work with organizations that do similar research, development, and dissemination, and through numerous publications and presentations at professional conferences.

The Learning Sciences Research Institute (LSRI) at the University of Illinois-Chicago is an interdisciplinary research and study center founded in 2007 by Susan Goldman, Distinguished Professor of Psychology and Education in University of Illinois-Chicago's College of Arts and Sciences, and James Pellegrino, Liberal Arts and Sciences Distinguished Professor and Distinguished Professor of Education. LSRI is home to more than 130 staff, students, faculty, and researchers.

SRI International is a research institute conducting client-sponsored research and development for government agencies, commercial businesses, foundations, and other organizations for 66 years. *SRI Education* harnesses a diversity of expertise from multiple research centers to meet the unique needs of each client. SRI assessment experts are experienced

in generating high quality assessments and scoring rubrics, documenting the development processes, and conducting validation studies to support accurate decisions.

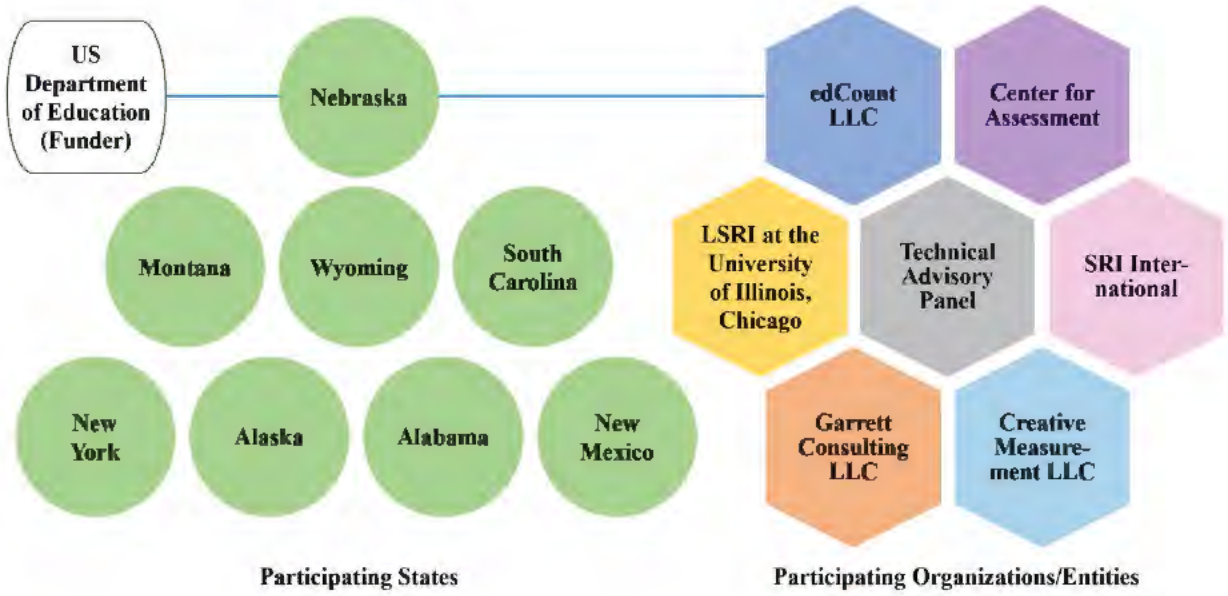
Creative Measurement Solutions, LLC, was founded by Dr. Daniel Lewis and is dedicated to resolving assessment challenges with partners in the industry. They provide services in assessment design and support for technical foundations and score report design. Dr. Lewis has been responsible for the design, technical foundations, and operational work associated with numerous assessment programs. Working with state departments of education, Dr. Lewis supported state summative assessment programs in meeting their needs and the accountability requirements associated with peer review.

Garrett Consulting, LLC, specializes in the evaluation of educational and professional development initiatives. Garrett Consulting has evaluated grants and contracts from numerous ED Offices, nine state governments, private foundations, and other funding sources. Garrett Consulting provides scientifically sound evaluation findings in an easy to use, practical manner for the purpose of program improvement, assessing program impact, and assuring accountability of state and federal funds.

Management Plan

The SIPS project includes eight partner states and six partner organizations. NE is the lead SIPS state, and edCount will serve as the primary contractor to NE. The other organizations will serve as subcontractors to edCount. In Exhibit 5, we illustrate the relationships among the state and organizational partners.

Exhibit 5. Relationships among State and Organizational Partners



The key personnel for this project consist of experienced state educators, consultants, and national experts representing an essential combination of expertise in NGSS-based science curriculum and assessment, principled-design, measurement, and project management and evaluation. Each key project staff person is introduced below. When appropriate, other members of the organizational and state partners may contribute to project processes and deliverables. All state partners are contributing time in kind.

Management Team

The management team will meet virtually biweekly to evaluate attainment of goals, monitor timelines, ensure production of high-quality deliverables, identify barriers and solutions to problems encountered by the project (including conducting a risk review with mitigation plans, as needed, during quarterly meetings), and ensure that the research-to-practice efforts honor the contributions, insights, needs, and unique concerns of all partners. The full project team (including all state and organizational partners) will meet virtually once monthly and once

annually. In addition, we designed this project to include as its third year a time to check for understanding and usefulness and to focus on dissemination. These activities are often left to the nebulous "post project" period and may not get the attention they require or deserve.

The project director and deputy project director will meet by phone quarterly with each state partner to monitor progress, identify potential barriers, anticipate state unique needs as the work unfolds, and address state concerns throughout the project cycle. They will report back to the management team on the status and refer common issues to the management team as appropriate, work directly with state partners and the external evaluators to monitor and report status of goals and timelines while working with the management team to smooth and integrate cross partner efforts, and provide oversight to partner organization subcontracts. The key personnel who serve on the management team are introduced below.

Senior Advisor and State Lead: Rhonda True, M.A., Nebraska Department of Education Enhanced Assessment Grant Specialist, joined the NDE in 2017 to coordinate the EAG-funded SCILLSS project. Previously, she was as an educator and administrator in for 34 years. As the Senior Advisor and State Lead for SIPS, Ms. True will ensure that the project is implemented in accordance with the needs of Nebraska and the other participating state partners.

Co-principal Investigator: Ellen Forte, Ph.D. is the CEO & Chief Scientist at edCount and has over two decades of experience conducting research, providing advice and reporting on standards, assessments, and accountability, and assisting SEAs and LEAs in the successful interpretation and implementation of education policies. As co-principal investigator she will provide oversight to all project tasks, including advisement for the involvement and contributions of the expert panel.

Co-principal Investigator: Jim Pellegrino, Ph.D. is Liberal Arts and Sciences Distinguished Professor and Distinguished Professor of Education and Co-director of UIC's Learning Sciences Research Institute (LSRI). He has served as PI or co-PI on multiple STEM education grants from NSF and IES as well as private foundations. As co-principal investigator and part of the management team, he will work directly with Dr. Forte in the development and design of all the project tasks.

Project Director: Erin Buchanan, M.A. is a Senior Associate with edCount and has extensive experience in project management. She serves as the Deputy Project Director and Reporting Lead for the SCILLSS project, managing all project phases and assisting with the application of a principled-design approach. As project director, Ms. Buchanan will provide oversight to all project tasks, including leadership for the Management Team.

Deputy Project Director: Antoinette Melvin, M.A. is an Associate at edCount with experience leading projects focused on professional development and training. She also has facilitating and supporting assessment development projects in New York and Indiana. As deputy project director and reporting lead, Ms. Melvin will support the project director in providing oversight to all project tasks.

Technical Staff

Lead Psychometrician: Dan Lewis, Ph.D. is Founder & Chief Scientist at Creative Measurement Solutions LLC. Dr. Lewis co-developed the widely-used Bookmark Standard Setting Procedure and developed the Embedded Standard Setting method. He established Creative Measurement Solutions to advance the application of Embedded Standard Setting as a logical extension of Principled Assessment Design.

Science Content and Assessment Specialists: Bill Herrera, M.S. and Charlene Turner, B.S. both have experience as senior project leads, assessment specialists, and science content specialists. Mr. Herrera and Ms. Turner have each served as content and assessment specialists for numerous large-scale state assessment projects and multi-state collaboratives (including NCSC and SCILLSS). They will provide science content expertise across each of the grade levels.

Principled-Design Specialist: Howard Everson, Ph.D. is a Senior Principal Education Researcher in SRI International's Education Division. He is also a Professor of Psychology at the Graduate School, City University of New York. Dr. Everson's research focuses on the intersection of cognition, technology, and assessment. He has contributed to developments in educational psychology, psychometrics, quantitative methods, and program evaluation. Dr. Everson is currently an elected member of the Board of Directors of the National Council of Measurement in Education.

Principled-Design Specialist: Daisy Rutstein, Ph.D. is a Principal Education Researcher in SRI International's Education Division, where she leads the assessment group. Dr. Rutstein's work focuses on the application of Evidence-Centered Design to develop assessments, particularly in the area of hard to measure constructs. Dr. Rutstein has experience leading science assessment development projects and is currently co-PI on two NGSS-aligned assessment evaluation projects.

Measurement Specialist: Scott Marion, Ph.D. is a national leader in designing innovative and balanced assessment systems to support instructional and accountability uses and is working to better conceptualize and implement high-quality balanced systems of assessment and accountability. Dr. Marion coordinates and/or serves on several state and district Technical

Advisory Committees (TAC) and has served on multiple National Research Council (NRC) committees to support designs for next generation science assessments.

Measurement Specialist: Nathan Dadey, Ph.D. is an associate at the Center for Assessment and is interested in the design, scaling, and use of educational assessments. He aims to produce methodological and applied work that contributes to improved understanding and use of assessment results in policy contexts. Dr. Dadey has been focusing recently on the measurement of the NGSS and has supported multiple states in developing conceptualizations of their NGSS statewide systems of assessments.

Curriculum and Assessment Design Specialist: Sania Zaidi, Ph.D. is a Visiting Research Scientist at LSRI. She has worked extensively on the design of NGSS-aligned curriculum materials and classroom assessments. Her research has involved close collaboration with teachers during the design and implementation of curricula and assessments. She also worked on the re-design of the Advanced Placement Biology assessments.

Curriculum and Assessment Design Specialist: Brian Gane, Ph.D. is a Research Assistant Professor at LSRI. His primary research interests center around the research and development of learning environments, including the design of assessments, instruction, and curriculum within those learning environments. In particular, he focuses on learning in science and engineering disciplines.

Curriculum and Assessment Design Specialist: Monlin (Monica) Ko, Ph.D. is a Research Assistant Professor at LSRI. Her research focuses on how students, teachers and the designed curriculum interact together to support meaningful science learning in secondary science classrooms. She has experience working collaboratively with teachers and school districts to design and facilitate professional learning opportunities with the goal of building

sustainable learning environments that support authentic sensemaking of science phenomena. Her work is informed by her experience as a former biology teacher and teacher researcher.

Curriculum and Assessment Design Specialist: Donald J. Wink, Ph.D. is a Professor of Chemistry and faculty member at LSRI. His work focuses on introductory and general education courses for pre-service elementary education majors, and laboratory curricula. This includes the introduction of evidence-centered design as a basis for the development and study of learning in the general chemistry laboratory. In addition, he has served as co-PI on several NSF-funded STEM projects.

External Evaluator

External Evaluator: Brent Garrett, Ph.D. is President of Garrett Consulting, LLC. Dr. Garrett has over 20 years of experience in evaluation and research, evaluating grants from numerous US Department of Education Offices, state governments, private foundations, and other funding sources. Dr. Garrett will serve as an external evaluator for the project and directly support external evaluation reporting and dissemination.

Other State Leads

Nebraska's experience serving as lead state for the SCILLSS project and their demonstrated commitment to enhancing their standards and assessment system in recent years make them the ideal lead state for SIPS. In addition, Montana and Wyoming, two partner states for SIPS, collaborated with Nebraska for SCILLSS. Nebraska, Montana, and Wyoming's prior experience working together on their science assessment systems will strengthen this new collaboration, which includes five additional states (Alaska, Alabama, New Mexico, New York, and South Carolina). Below we introduce the key personnel from each state partnering with NDE on the SIPS project.

Alaska: Isaac Paulson is the Assessments Administrator for the Alaska Department of Education and Early Development, supervising administration of Alaska's statewide assessment system. Prior to joining DEED, he was a teacher and district-level administrator in very remote villages of Alaska.

Alabama: Amy Murphy serves as an administrator with the Alabama Math, Science, and Technology Initiative at the Alabama State Department of Education. During her 21 years in education, she has designed and facilitated professional learning opportunities and developed curriculum at the at the local, state, and national level. She is dedicated to research-based, student-centered methods of instruction as a means of creating and nurturing lifelong learners.

Montana: Ashley McGrath is the Assessment Director at the Montana Office of Public Instruction. Ms. McGrath is a former high school science educator and is committed to providing high-quality technical assistance and professional learning to enhance teaching and learning and to support schools using Montana's balanced assessment systems.

New Mexico: Lynn Vásquez has over 20 years of experience in managing large-scale testing programs and has held education leadership positions at the local, state, and federal levels. As the PED Assessment Director, she is committed to transforming the state assessment system and developing multiple measures of student learning with a focus on cultural and linguistic relevance.

New York: Zachary Warner is the Director of State Assessment for the New York State Education Department and oversees the coordination, development and administration of assessments within the New York State Testing Program which serves 2.6 million students. Dr. Warner has previously worked as a psychometrician and education researcher for New York State and began his career as a high school mathematics teacher.

South Carolina: Elizabeth Jones is the Director of the Office of Assessment at the South Carolina Department of Education. Her office manages the development, administration, scoring, and reporting of statewide assessments for public school students in kindergarten through grade 12. Ms. Jones has been with the Office of Assessment since 1985 and director since 2010.

Wyoming: Shannon Wachowski is the Science Consultant for the Wyoming Department of Education. In her 14-year career as an educator, Shannon has taught a variety of science and math classes in rural high school settings as well as facilitated professional development for teachers. Originally a chemical engineer, she left industry to pursue a career of life-long learning and helping others learn.

SIPS Technical Advisory Panel (TAP)

Throughout the description of the project design, we define critical points for the engagement of expert panelists for review of project processes and deliverables. The goal is to seek feedback and recommendations to improve the overall quality of each deliverable. Selected expert panelists will convene virtually, along with the management team and state leads, at the SIPS annual meetings to contribute their expertise in meeting the project goals. We will also match expert panelists' experience and expertise to the creation of specific deliverables for review to ensure active feedback rather than post-hoc review of deliverables. The project director and deputy project director will coordinate the TAP. Below, we introduce each expert panelist.

Aneesha Badrinarayan, M.S., is a senior advisor at the Learning Policy Institute. Her work focuses on supporting states, districts, and educators to develop and implement student-centered systems of assessment that support all learners. She has led several multi-state teams to redefine "alignment" in the era of new state standards; developed criteria for innovative assessments;

provided professional learning state leaders; and conducted analyses of efforts to design and implement performance assessments and systems of assessment in science.

Chad Buckendahl, Ph.D., is a Partner with ACS Ventures, LLC. His research interests include standard setting, test evaluation, and validity. Dr. Buckendahl has designed and led numerous validation studies. He currently serves on multiple TACs; editorial boards for peer reviewed journals; and on volunteer committees for the Association of Test Publishers, Institute for Credentialing Excellence and National Council on Measurement in Education.

Kristen Huff, Ph.D., currently serves as Vice President of Assessment and Research at Curriculum Associates, Inc. She is a member of the board of directors for the National Council of Measurement in Education and serves as associate editor for *Applied Measurement in Education*. Dr. Huff has two decades of experience in standards-aligned assessment design, evaluation, educational measurement, and psychometric research.

Joseph S. Krajcik, Ph.D., serves as Director of the CREATE for STEM Institute and is the Lappan-Phillips Professor of Science Education at Michigan State University. During his career, Dr. Krajcik has focused on working with science teachers to reform teaching practices to promote students' engagement in and learning of science through the design, development, and testing of project-based science learning environments.

Suzanne Lane, Ph.D., is a Professor of Research Methodology in the School of Education at the University of Pittsburgh. She researches educational measurement and testing, with a focus on design, technical, validity and policy issues, including performance-based assessments. She has served as the President of NCME, the Vice President of Division D-AERA, and as a member of the Joint Committee for revising the Standards for Educational and Psychological Testing.

Ric Luecht, Ph.D., is a Professor of Educational Research Methodology at UNC-Greensboro. He researches technology integration in assessment, advanced psychometric modeling and estimation, and the application of engineering design principles for formative assessment. He has designed numerous programs for automated test assembly and a computerized adaptive multistage testing framework used by several large-scale testing programs.

Paul Nichols, Ph.D., is currently the Director of Assessment Design at NWEA and is responsible for leading efforts in developing next generation assessments that integrate learning sciences with the design and implementation assessments for learning. He has nearly three decades of experience ensuring that assessment designs, theories of action, and score interpretations and intended uses are technically defensible and connected to customer needs.

David Pugalee, Ph.D., is a full professor, and Director of the Center for STEM at UNC Charlotte. Dr. Pugalee served as part of the writing team for the National Council of Teachers of Mathematics Navigations series and the National Council of Supervisors of Mathematics Great Tasks. Dr. Pugalee has more than a decade of classroom teaching experience and has led multi-million-dollar projects related to STEM education.

Christina Schneider, Ph.D., works to build coherent connections among classroom assessments, interim assessments, and large-scale assessments. Her research has been published in Applied Measurement in Education, Peabody Journal of Education, Journal of Psychoeducational Assessment, Journal of Multidisciplinary Evaluation and Educational Assessment. She is the Sr. Director of Psychometrics & Learning Science at NWEA.

Jill Wertheim, Ph.D., directs science assessment programs at the Stanford Center for Assessment, Learning, & Equity. In this position, Dr. Wertheim focuses on the development of

systems of assessment for science that include performance assessments. She works with educators, district and regional offices, and state leaders to develop and use performance assessments to guide teaching and learning of the Next Generation Science Standards (NGSS).

Project Evaluation

Our evaluation plan will ensure that SIPS tasks, activities, and final deliverables meet project goals, are of high quality, and are completed within the timelines of the grant. The lead evaluator for the project, Dr. Brent Garrett, will evaluate processes, products, and results throughout the implementation of the project to allow for the formative feedback to guide decision-making and product development and refinement. Dr. Garrett will provide this feedback as part of the monthly management team meetings and through established reporting channels.

Data Collection

We have proposed multiple data collection methods for assessing the effectiveness of project implementation strategies on impacting our intended outcomes. These include: 1) surveys and interviews with state and organizational partners, expert panelists, and state and local assessment and instructional personnel, 2) existing state and local level assessment data, 3) technical documentation, and 4) formative data including meeting and workshop evaluation data, meeting notes, and other project artifacts. These data will quantitatively and qualitatively assess overall project effectiveness, but will also provide foundational data for further testing and replication in other states. All instruments and procedures will be developed, tested, and implemented in accordance with standard evaluation protocols (Fowler, 2002; Dillman, 1999; Krueger & Casey, 2000).

Exhibit 6. Data Collection Processes for Project Evaluation

Task	Data Collection Processes
Task 1: Project Planning, Research	(1) Online activity reporting systems, (2) meeting minutes, (3) partner surveys, (4) collaboration survey, (5) Completed project TOA
Task 2: Claims, MTs, PLDs, Tools/Templates	(1) Claims, MTs, and PLDs, (2) curricular alignment tools and unit templates
Task 3: Curriculum Prototypes, Common Assessments	(1) Model course development survey, (2) evaluation results for model courses, classroom assessment workshops, and educator meetings, (3) quality and impact surveys on quality and impact of
Task 4: Workshops	model courses, process guide, design tools, templates, and tasks
Task 5: Pilot Study	(1) Pilot study report with teacher feedback and student achievement data, (2) completed curricular units and common assessments, (3) quality and impact surveys on curriculum and common assessments
Phase 6: Evaluation, Dissemination, Reporting	(1) Online activity reporting system, (2) monthly, quarterly, and annual reports, (3) technical reports, (4) list of publications and presentations.

Methods

An online data collection and reporting system will be used to minimize reporting and data collection burdens for organizational and state partners. This Google-based tool allows both for reporting of project activities and real-time reporting on a web-based dashboard. The dashboard also produces easy to read and use monthly, quarterly, and annual reports. Quantitative survey data will generally be analyzed using frequency and descriptive statistics. Qualitative data from surveys and interviews will be analyzed through inductive theming, so that responses are

organized in a clear, easy to use manner for project staff and partners. Document reviews will be used to assess the quality, relevance, and utility of formative data such as meeting minutes and communication with stakeholders, as well as more summative data contained in technical documentation. The external evaluator will work closely with project and state partners to assess the impact of SIPS activities on state assessment results.

Performance Measures

Three performance measures were designed to determine how well the three project goals have been obtained. Further project performance measures (PM) will be developed and shared with SIPS project management for program improvement and with the ED for accountability purposes.

- PM 1: 80% of TAP members and participating educators' report that the bank of instructionally-embedded science assessment tasks, aligned with an actionable performance scale, were useful and valid indicators of student achievement.
- PM 2: 80% of state and local educators report increased capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions.
- PM 3: 80% of educators and parents report that SIPS fostered a successful partnership for student success.

Besides the project specific performance measures listed above, we will also collect data and report on the three Government Performance and Results Act (GPRA) measures:

- GPRA 1: *Demonstrate significant progress towards improving, developing, or implementing a new model for measuring the achievement of students.* Monthly, quarterly, and annual reports, as well as the data used to support PM 1 will provide data to demonstrate the development and implementation of the SIPS model.

- GPRA 2: *Demonstrate collaboration with institutions of higher education, other research institutions, or other organizations to develop or improve State assessments.* An annual collaboration survey, augmented with ongoing interviews and surveys, will assess the degree and quality of collaboration among all project partners.
- GPRA 3: *At least three times during the period of their grants, make available to SEA staff in non-participating States and to assessment researchers information on findings resulting from the CGSA program.* These data will be reported via monthly, quarterly, and annual reports.

Reporting and Use of Evaluation Findings

The project external evaluator will serve as an active member on the project management team, using an inclusive evaluation model, instead of the traditional approach where evaluators remain distant (Perry, Thomas, DuBois, & McGowan, 2006). We will capitalize on the expertise of our external evaluator by 1) learning more about how to use and incorporate data into our work, and 2) informing our policy decisions with high quality data available (Grob, 2006).

It is essential to have high quality data that are available in a timely manner. Our intent is to ensure that policy enables practice and practice informs policy. The previously mentioned real time, online data collection system will facilitate the timely collection and sharing of data. The external evaluator will submit monthly and quarterly reports to project management to be shared with organizational and state partners, as well as ED. The quarterly reports will be aggregated to form the basis of the Annual Performance Reports (APR) required by ED. Annual reports will summarize the formative data from throughout the year and provide annual summative and cumulative data. Other reporting will occur as needed, such as formative reports on the quality and impact of training and support provided to project partners.

The evaluation data will also provide guidance about effective strategies suitable for replication or testing in other settings. We intend to use a *learning orientation* approach to evaluation (McLaughlin, 2001) to guide our learning and replication efforts: (1) *what factors are influencing emerging outcomes and in what ways,* (2) *what factors are influencing final outcomes and in what ways,* (3) *what factors in the context or implementation environment of our initiatives may have influenced success – positively or negatively,* and (4) *what unintended effects are occurring or have occurred?*

Other Attachment File(s)

* **Mandatory Other Attachment Filename:** 1236-SIPS Other Attachments.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

Other Attachments

The following documents are included in this attachment:

- The Nebraska Department of Education's Indirect Cost Rate Agreement
- Letters of Commitment and Understanding
- Resumes for Key Personnel
- References for the Project Narrative

INDIRECT COST RATE AGREEMENT
STATE EDUCATION AGENCY

Organization:

Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68509-4987

Date: May 26, 2020

Agreement No: 2020-019

Filing Reference: This replaces previous Agreement No. 2017-080
Dated: 7/21/2017

The approved indirect cost rates herein are for use on grants, contracts, and other agreements with the Federal Government. The rates are subject to the conditions included in Section II of this Agreement and regulations issued by the Office of Management and Budget (OMB) Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards under 2 CFR 200.

Section I - Rates and Bases

Type	From	To	Rate	Base	Applicable To
Predetermined	7/1/2020	6/30/2023	12.7%	MTDC	Unrestricted
Predetermined	7/1/2020	6/30/2023	8.8%	MTDC	Restricted

Distribution Base:

MTDC	Modified Total Direct Cost - Total direct costs excluding equipment, capital expenditures, participant support costs, pass-through funds and the portion of each subaward (subcontract or subgrant) above $25,000 (each award; each year).

Applicable To:

Unrestricted	Unrestricted rates apply to programs that do not require a restricted rate per 34 CFR 75.563 and 34 CFR 76.563.
Restricted	Restricted rates apply to programs that require a restricted rate per 34 CFR 75.563 and 34 CFR 76.563.

Treatment of Fringe Benefits:
Fringe benefits applicable to direct salaries and wages are treated as direct costs. Pursuant to 2 CFR 200.431, (b), (3), Paragraph (i), unused leave costs for all employees are allowable in the year of payment. The treatment of unused leave costs should be allocated as an indirect cost except for those employee salaries designated as a direct cost for the restricted rate calculation.

Capitalization Policy: Items of equipment are capitalized and depreciated if the initial acquisition cost is equal to or greater than $5,000.

Section II – Particulars

Limitations: Application of the rates contained in this Agreement is subject to all statutory or administrative limitations on the use of funds, and payments of costs hereunder are subject to the availability of appropriations applicable to a given grant or contract. Acceptance of the rates agreed to herein is predicated on the following conditions: (A) that no costs other than those incurred by the Organization were included in the indirect cost pools as finally accepted, and that such costs are legal obligations of the Organization and allowable under the governing cost principles; (B) the same costs that have been treated as indirect costs are not claimed as direct costs; (C) that similar types of information which are provided by the Organization, and which were used as a basis for acceptance of rates agreed to herein, are not subsequently found to be materially incomplete or inaccurate; and (D) that similar types of costs have been accorded consistent accounting treatment.

Accounting Changes: The rates contained in this agreement are based on the organizational structure and the accounting systems in effect at the time the proposal was submitted. Changes in organizational structure or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rates in this agreement, require the prior approval of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowance.

Provisional/Final/Predetermined Rates: A proposal to establish a final rate must be submitted. The awarding office should be notified if the final rate is different from the provisional rate so that appropriate adjustments to billings and charges may be made. Predetermined rates are not subject to adjustment.

Fixed Rate: The negotiated fixed rate is based on an estimate of the costs that will be incurred during the period to which the rate applies. When the actual costs for such period have been determined, an adjustment will be made to a subsequent rate calculation to compensate for the difference between the costs used to establish the fixed rate and the actual costs.

Notification to Other Federal Agencies: Copies of this document may be provided to other Federal agencies as a means of notifying them of the agreement contained herein.

Audit: All costs (direct and indirect, federal and non-federal) are subject to audit. Adjustments to amounts resulting from audit of the cost allocation plan or indirect cost rate proposal upon which the negotiation of this agreement was based may be compensated for in a subsequent negotiation.

Reimbursement Ceilings/Limitations on Rates: Awards that include ceiling provisions and statutory/ regulatory requirements on indirect cost rates or reimbursement amounts are subject to the stipulations in the grant or contract agreements. If a ceiling is higher than the negotiated rate in Section I of this agreement, the negotiated rate will be used to determine the maximum allowable indirect cost.

Section III - Special Remarks

Alternative Reimbursement Methods: If any federal programs are reimbursing indirect costs by a methodology other than the approved rates in this agreement, such costs should be credited to the programs and the approved rates should be used to identify the maximum amount of indirect costs allocable.

Submission of Proposals: New indirect cost proposals are necessary to obtain approved indirect cost rates for future fiscal years. **The next indirect cost rate proposal is due six months prior to the expiration dates of the rates in this agreement.**

Section IV – Approvals

For the State Education Agency:

Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68509-4987

[redacted]
Signature

Bryce Wilson
Name

Admistrator of Financial + Administrative Services
Title

5/28/20
Date

For the Federal Government:

U.S. Department of Education
OFO / OGA / ICD
550 12th Street, SW
Washington, DC 20202-4450

Andre Hylton
Digitally signed by Andre Hylton
Date: 2020.05.25 06:36:15 -04'00'
Signature

Andre Hylton
Name

Director, Indirect Cost Division
Title

May 26, 2020
Date

Negotiator: Anthony Johnson
Telephone Number: (202) 245-8053

Part 7: MOU/MOA or Consortium Agreement Documentation

The following letters of commitment and understanding serve as the SIPS partners' Consortium Agreement Documentation.

STATE OF ALABAMA
DEPARTMENT OF EDUCATION

Eric G. Mackey, Ed.D.
State Superintendent of Education

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The Alabama State Department of Education is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,

[redacted]

Dr. Amy Fowler Murphy, NBCT
Alabama Science in Motion Administrator
Alabama Math, Science, and Technology Initiative
Alabama State Department of Education

GORDON PERSONS BUILDING • P.O. BOX 302101 • MONTGOMERY, ALABAMA 36130-2101 • TELEPHONE (334) 694-4900 • FAX (334) 694-4990 • WEB SITE: www.alsde.edu

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Education & Early Development

DIVISION OF INNOVATION & EDUCATION EXCELLENCE

801 West 10th Street, Suite 200
P.O. Box 110500
Juneau, Alaska 99811-0500
Main: 907.465.2830
Fax: 907.465.6760

June 18, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The Alaska Department of Education & Early Development is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,

[redacted]

Tamara Van Wyhe, Division Director

Cc: Isaac Paulson, Assessments Administrator
Deborah Riddle, Division Operations Manager

Elsie Arntzen, Superintendent
PO Box 202501
Helena, MT 59620-2501
406.444.5643
In-State Toll-free: 1.888.231.9393
TTY Users: 406.444.0235
opi.mt.gov

OFFICE OF PUBLIC INSTRUCTION
STATE OF MONTANA

Putting Montana Students First

June 22, 2020

Rhonda True, Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The Montana Office of Public Instruction is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,

[redacted]

Ashley McGrath, Assessment Director
Montana Office of Public Instruction
Phone: 406.444.3656
Email: amcgrath@mt.gov

STATE OF NEW MEXICO
PUBLIC EDUCATION DEPARTMENT
300 DON GASPAR
SANTA FE, NEW MEXICO 87501-2786
Telephone (505) 827-5800
www.ped.state nm.us

RYAN STEWART, ED.L.D.
SECRETARY OF EDUCATION

MICHELLE LUJAN GRISHAM
GOVERNOR

June 16, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The New Mexico Department of Public Education is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,

Lynn Vasquez
Lynn Vasquez, Director of Assessments
New Mexico Department of Public Education

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

Deputy Commissioner Dr. Kimberly Young Wilkins
Office of Instructional Support
89 Washington Avenue – Room 875 EBA Albany, New York 12234

Phone: (518 474-5916
Fax: (518) 486-2233

June 16, 2020

Jeremy Heneger
Assessment Team Director
Nebraska Department of Education
301 Centennial Mall South
P.O. Box 94987
Lincoln, NE 68509-4987
jeremy.heneger@nebraska.gov

Dear Director Heneger,

On behalf of the New York State Education Department (NYSED), I write to express our support for the Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments project, a Multi-State development effort to be funded by a grant from the Competitive Grants for State Assessment (CSGA) Program of the U.S. Department of Education. NYSED is interested in the opportunity to collaborate with you in developing instructionally-embedded assessments that directly support student learning in science. We are also pleased that one of the intents of this project is to design performance tasks which could be administered remotely. NYSED is committed to the goal of providing high quality instructional supports that promote science learning at the elementary, intermediate, and high school levels.

For this project, Director of State Assessment, Dr. Zachary Warner will serve as NYSED's point of contact. A brief professional biography and curriculum vitae for Dr. Warner are included with this letter.

We are pleased to have this opportunity to partner in this project with the State of Nebraska, a geographically diverse group of other states, edCount, LLC, and several other partner organizations including the Center for Assessment, SRI International, and the Learning Sciences Research Institute at the University of Illinois at Chicago. We look forward to providing supporting coordination with districts and implementation of project meetings with local educators.

Sincerely,

[redacted]

Kimberly Young Wilkins

Enclosures

c: Rhonda True
Ellen Forte
Steven E. Katz
Zachary B. Warner

STATE OF SOUTH CAROLINA
DEPARTMENT OF EDUCATION

MOLLY M. SPEARMAN
STATE SUPERINTENDENT OF EDUCATION

June 16, 2020

Ms. Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, and Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The South Carolina Department of Education is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

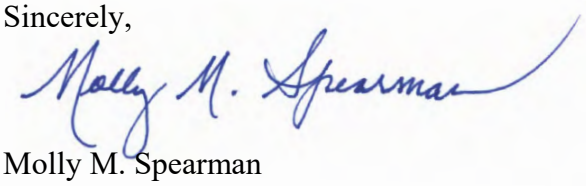
Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for

student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,



Molly M. Spearman
State Superintendent of Education

MMS/ej

CREATING OPPORTUNITIES FOR STUDENTS TO KEEP WYOMING STRONG

WYOMING
DEPARTMENT OF EDUCATION

JILLIAN BALOW
Superintendent of Public Instruction

DICKY SHANOR
Chief of Staff

SHELLEY HAMEL
Chief Academic Officer

KARI EAKINS
Chief Policy Officer

TRENT CARROLL
Chief Operations Officer

CHEYENNE OFFICE
122 W. 25th St. Suite E200
Cheyenne, WY 82002
307-777-7675

RIVERTON OFFICE
320 West Main
Riverton, WY 82501
307-857-9250

ON THE WEB
edu.wyoming.gov
twitter.com/WYOEducation
facebook.com/WYOEducation

June 18, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

The Wyoming Department of Education is pleased to partner with the Nebraska Department of Education (NDE) as a participating state for the proposed project under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) titled Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments. As a state participant, we endorse NDE as the fiscal agent for the grant. We confirm that we intend to participate in the submission of this proposal, and we look forward to collaborating with our partners to accomplish the goals of this project.

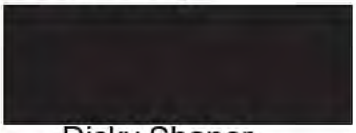
Staff from our state will participate in meetings and collaborate with staff from other states and project staff to ensure that the project is successful in helping us meet critical documentation and reporting needs. We affirm that we will provide any data that are required for grant reporting with the understanding that these data will not include any student- or teacher- level information. We also agree to work with SIPS project staff to engage educators and school districts in our state to participate in science assessment task development workshops and pilot studies of those tasks.

We believe our educators, students, and other stakeholders will benefit from this collaborative project, which brings together several states and five independent organizations. Each of us brings unique perspectives and resources, which will enhance the quality and utility of deliverables. Through the SIPS project, we will build our

state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions. We will also engage educators, students, and parents in a partnership for student success across a range of circumstances and learning environments. Finally, we will gain access to science curriculum and assessment materials developed through SIPS.

We appreciate the opportunity to participate in the proposed project. Thank you.

Sincerely,



Dicky Shanor
Chief of Staff

edCount LLC
because all students count

June 22, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

On behalf of our team at edCount, LLC, I am writing to confirm our intent to collaborate with the Nebraska Department of Education (NDE) in support of the proposed project titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* which is being submitted to the 2020 Competitive Grants for State Assessments program (CFDA 84.368A) issued by the US Department of Education.

Our team, in collaboration with The National Center for the Improvement of Educational Assessment, Learning Sciences Research Institute at the University of Illinois at Chicago, SRI International, Creative Measurement Solutions, and Garrett Consulting, LLC will support the NDE with the implementation of SIPS providing a Project Director and other staff to manage and support technical implementation of the project, establishing the infrastructure needed to carry out the project, coordinating the work of all the organizational partners and providing on-going support to all participating states. Our team at edCount is experienced in the fields of assessment development, implementation, and accountability; curriculum development; educator professional development; and management of collaborative ventures. We have the expertise and infrastructure necessary to create innovative and practical solutions to states' unique needs.

We appreciate the opportunity to participate in this effort and look forward to working with NDE to accomplish the goals of the proposed project and develop solutions that address the 2020 priorities as described in the CGSA notice inviting applications.

Sincerely,

[redacted]

Ellen Forte, Ph.D.
CEO & Chief Scientist

UIC LEARNING SCIENCES
UNIVERSITY OF ILLINOIS AT CHICAGO RESEARCH INSTITUTE

1240 W. Harrison Street, Room 1535 (MC 057) • Chicago, IL 60607 • (312)996-2448 ph • (312)413-7411 fax • www.lsri.uic.edu

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

On behalf of our team at the Learning Sciences Research Institute at The University of Illinois, Chicago, I am writing to confirm our intent to collaborate with the Nebraska Department of Education (NDE) in support of their response to the invitation for proposals issued by the Office of Elementary and Secondary Education at the US Department of Education under the 2020 Competitive Grants for State Assessments (CGSA) program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments.*

Our team, in collaboration with edCount, LLC, SRI International, the Center for Assessment, and Creative Measurement Solutions will support the proposed project which aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances. We agree to accomplish the activities assigned to us within the proposal including the following:

- Support conceptualization of online task development platform and repository;
- Serve in an advisory role to support development of claims, measurement targets, and PLDs; support selection of NGSS bundles; support development of student profiles and progressions; support development of curricular alignment tools, unit templates, and assessment templates;
- Support development and facilitation of UbD, UDL/accessibility, PAD and NGSS trainings; supporting the drafting of UbD Curricular Units for NGSS model bundles; participate in reviews; help revise and refine curricular units and assessments; support process documentation;
- Support facilitation of virtual educator assessment task development workshops; provide task feedback to educators; support facilitation of virtual educator sessions to share task feedback and provide guidance to inform revisions to classroom tasks; help to finalize the tasks;
- Support development of pilot study criteria and protocol; support development of pilot materials and data collection tools; gather, analyze, and summarize pilot study results and educator vignettes, including student artifacts and educator annotations regarding observations of student performance and instructional decisions at key points during the instructional sequence; collaborate with other partners to refine and finalize the curricular units based on educator feedback;
- Support development of dissemination plan and reports

We are excited to collaborate with you and our partners to accomplish the project goals and appreciate the opportunity to participate in this effort.

Sincerely,

[redacted]

James W. Pellegrino
Liberal Arts and Sciences Distinguished Professor
Co-director, *Learning Sciences Research Institute*
pellegjw@uic.edu

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

On behalf of our team at the National Center for the Improvement of Educational Assessment, Inc. (Center for Assessment), I am writing to confirm our intent to collaborate with the Nebraska Department of Education (NDE) in support of their response to the invitation for proposals issued by the Office of Elementary and Secondary Education at the US Department of Education under the 2020 Competitive Grants for State Assessments (CGSA) program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*.

Our team, in collaboration with edCount, LLC, SRI International, Learning Sciences Research Institute at the University of Illinois at Chicago, and Creative Measurement Solutions, will support the proposed project which aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances. We agree to provide the following support for the SIPS project:

- Support conceptualization of online task development platform and repository;
- Serve in an advisory role to support development of claims, measurement targets, and PLDs; support selection of NGSS bundles; support development of student profiles and progressions; support development of curricular alignment tools, unit templates, and assessment templates; collaborate with Creative Measurement to begin conceptualizing measurement model(s) from an evidence-based design perspective and to advise SIPS team on comparability across states;
- Serve in an advisory role and participate in reviews;
- Advise and support virtual sessions with educators and revisions of tasks;
- Co-lead the development of pilot study timeline, process, criteria and protocol; advise on the recruitment of educators from across partner states; co-lead the design of the study and develop sampling methods; co-lead the development of pilot materials and data collection tools; advise and support orientations, trainings, and meetings prior to and throughout the pilot study period to support curriculum and assessment implementation; co-lead the analysis

and summary of pilot study results and educator vignettes, including student artifacts and educator annotations regarding observations of student performance and instructional decisions at key points during the instructional sequence; advise the refinement and finalization of curricular units based on educator feedback;

- Advise the design and development of dissemination plan; support development of reports.

The Center for Assessment is a NH-based not-for-profit corporation that was founded to address the changes underway in educational assessment and accountability. We strive to increase student learning through more meaningful educational assessment and accountability practices and engage in partnerships with state and district education leaders to design, implement, and evaluate assessment and accountability policies and programs, and to design technically sound policy solutions to support important educational goals.

We are excited to collaborate with you and our partners to accomplish the project goals and appreciate the opportunity to participate in this effort.

Sincerely,

Scott F. Marion
Executive Director
National Center for the Improvement of Educational Assessment, Inc.

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

On behalf of our team at SRI International, I am writing to confirm our intent to collaborate with the Nebraska Department of Education (NDE) in support of their response to the invitation for proposals issued by the Office of Elementary and Secondary Education at the US Department of Education under the 2020 Competitive Grants for State Assessments (CGSA) program (CFDA 84.368A) titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments*.

Our team, in collaboration with edCount, LLC, The National Center for the Improvement of Educational Assessment, Learning Sciences Research Institute at the University of Illinois at Chicago, and Creative Measurement Solutions will support the proposed project which aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances. We agree to accomplish the activities assigned to us within the proposal including the following:

- Support conceptualization of online task development platform and repository;
- Serve in an advisory role to support development of claims, measurement targets, and PLDs; support selection of NGSS bundles; support development of student profiles and progressions; support development of curricular alignment tools, unit templates, and assessment templates;
- Support common assessment development; participate in reviews; advise the revision of curricular units; directly support revision of assessments; support process documentation;
- Collaborate with edCount to facilitate virtual educator assessment task development workshops and serve in an advisory role to support the finalization of tasks;
- Advise/support pilot study sampling methods and results analysis; and
- Support development of a dissemination plan and reports.

SRI International is an independent research and development center committed to serving both government and industry by encouraging collaboration across technical disciplines to solve real-world problems. We are experienced in developing research-based solutions in the fields of education technology, education policy, and learning and development, and have worked with government agencies, regions, foundations, and school districts for decades. We are excited to collaborate with our partners to develop innovative solutions that address the 2020 priorities as described in the CGSA application notice.

We appreciate the opportunity to participate in this effort and look forward to working with you and your NDE colleagues to accomplish the goals of the proposed project.

Sincerely,

[redacted]

Howard T. Everson, Ph.D.
Senior Principal Research Scientist
Center for Educational Research & Innovation
SRI International

Creative Measurement Solutions LLC
2801 1st Avenue #407
Seattle, WA 98121
831-601-8555

Efficient. Innovative. Elegant. Enduring.
Solutions that improve assessment

June 19, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm that Creative Measurement Solutions LLC, intends to collaborate with the Nebraska Department of Education (NDE) in support of their response to the invitation for proposals issued by the Office of Elementary and Secondary Education at the US Department of Education under the 2020 Competitive Grants for State Assessments (CGSA) program (CFDA 84.368A). The proposed project is titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* and aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances.

Our team, in collaboration with edCount, LLC, SRI International, Learning Sciences Research Institute at the University of Illinois at Chicago, and National Center for the Improvement of Educational Assessment, Inc., will support the proposed project which aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances.

We agree to provide the following support for the SIPS project:

- Serve in an advisory role to support development of claims, measurement targets, and PLDs; support development of curricular alignment tools, unit templates, and assessment templates; collaborate with the Center for Assessment to begin conceptualizing measurement model(s) from an evidence-based design perspective and to advise SIPS team on comparability across states;
- Serve in advisory role for curriculum framework design;
- Co-lead the development of pilot study timeline, process, criteria and protocol; advise the recruitment of educators from across partner states; co-lead the design of the study and develop sampling methods; co-lead the development of pilot materials and data collection tools; advise and support orientations, trainings, and meetings prior to and throughout the pilot study period to support curriculum and assessment implementation; co-lead the analysis and summary of pilot study results and educator vignettes, including student artifacts and educator annotations regarding observations of student performance and instructional decisions at key points during the instructional sequence; advise the refinement and finalization of curricular units based on educator feedback;
- Support development of dissemination plan and reports (collaborate with the Center for Assessment in writing about methodological considerations, etc.).

Creative Measurement Solutions is dedicated to resolving assessment challenges with partners in the industry and we are excited to collaborate with the NDE and our partners to accomplish the SIPS project goals. I appreciate the opportunity to participate in this effort.

Sincerely,

Daniel Lewis
Founder & Chief Scientist
Creative Measurement Solutions LLC

Garrett Consulting, LLC
4325 Statton Rd.
Louisville, KY 40220
502-762-3515
brent@bgarrettconsulting.net

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve as external evaluator for the proposed project the Nebraska Department of Education (NDE) is submitting in response to the invitation for applications issued by the Office of Elementary and Secondary Education at the US Department of Education under the 2020 Competitive Grants for State Assessments (CGSA) program (CFDA 84.368A). The proposed project is titled *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* and aims to establish a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale; build state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and engage educators, students, and parents in a partnership for student success across a range of circumstances.

I have served as an evaluation consultant for over 20 years and have served as the external evaluator for the Enhanced Assessment Grant project issued to Nebraska in 2016. As the external evaluator for the SIPS project, I agree to conduct the project evaluation, design the project reporting dashboard, and develop meeting summaries and monthly, quarterly, and annual reports.

Thank you for including me in your proposal development. I look forward to working with the NDE to accomplish the goals of the proposal project and appreciate the opportunity to participate in this effort.

Sincerely,

[redacted]

Brent Garrett
Garrett Consulting, LLC

ACS VENTURES
BRIDGING THEORY & PRACTICE

June 22, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A). There are aspects of the project that crossover with emerging thoughts in the certification and microcredentialing space. The SIPS project has an opportunity to make a meaningful contribution that will promote cross-disciplinary thinking and activities.

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my experience in education, licensure, and certification, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

Chad W. Buckendahl

Chad W. Buckendahl, Partner
cbuckendahl@acsventures.com
402.770.0085

University of Pittsburgh | School of Education

5900 Wesley W. Posvar Hall
230 South Bouquet Street
Pittsburgh, PA 15260
412-648-1780
www.education pitt.edu

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, implement, and use the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

[redacted]

Suzanne Lane
Professor of Research Methodology
University of Pittsburgh

LEARNING POLICY INSTITUTE
Research. Action. Impact.

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

[redacted]

Aneesha Badrinarayan
Senior Advisor
Learning Policy Institute

Luecht Assessment Technology Services, LLC
162 Genes Road
Franklin, North Carolina 28734-4900
ric.luecht@luechtassessmenttechnologies.com
rmluecht@gmail.com
336.404.0746 (cell)

18 June 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

Richard M. Luecht, Ph.D.
Luecht Assessment Technology Services, LLC
CEO & Chief Scientist

June 24, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

Kristen Huff
Vice President, Assessment and Research
Curriculum Associates
Khuff@cainc.com

MICHIGAN STATE
UNIVERSITY

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

[redacted]

Joseph Krajcik
Director, CREATE for STEM Institute
Professor, Science Education
Michigan State University
East Lansing, MI 48824
krajcik@msu.edu
517-432-0816

CREATE for STEM
College of Natural Science
College of Education
Erickson Hall
620 Farm Lane, room 115
East Lansing, MI 48824
Ph: 517-432-0816
Fax: 517-353-6393

UNC CHARLOTTE
Center for STEM Education

Cato College of Education Bldg., Suite 222
9201 University City Blvd., Charlotte, NC 28223-0001

June 17, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely yours,

[redacted]

Professor David Pugalee, Ph.D.
Director, Center for STEM Education
(704)-687-8887; David.Pugalee@uncc.edu

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am confirming my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration, led by the state of Nebraska, between states and independent organizations addresses a critical need of building teacher capacity to offer high-quality coherent science instruction and assessment centered in focusing teachers on increasing sophistication of student thinking. State collaboration in establishing tools and resources that are user tested in participating states will benefit any state or local education agency as they seek to enhance and inform their science instruction and assessment. Creating a bank of coherent, connected instructionally-embedded science assessment tasks will elicit evidence of student thinking to better serve formative processes while at the same time supporting mastery determinations.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this exciting and important project for teachers and students.

Sincerely,

[redacted]

Christina Schneider
Sr. Director, Psychometrics and Learning Science
NWEA

NWEA
Northwest Evaluation Association
Partnering to help all kids learn

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

This collaboration between states and independent organizations addresses critical state needs by building state educators' capacity to offer high-quality coherent science instruction and assessment. The SIPS project will establish tools and resources that any state or local education agency could use to enhance and inform their science instruction and assessment, including a bank of instructionally-embedded science assessment tasks.

Drawing on my expertise, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

[redacted]

Paul Nichols
Director of Assessment Design
NWEA

Northwest Evaluation Association
121 NW Everett Street Portland, OR 97209
t 503.624.1951 f 503.639.7873 www.nwea.org

Stanford University

June 23, 2020

Rhonda True
Enhanced Education Grant Specialist
Office of Teaching, Learning, & Assessment
Nebraska Department of Education
301 Centennial Mall South
Lincoln, NE 68508

Dear Ms. True:

I am writing to confirm my intent to serve on the national expert panel for the proposed *Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments* project application being submitted by the Nebraska Department of Education (NDE) under the 2020 Competitive Grants for State Assessments program (CFDA 84.368A).

There is tremendous need for local education agencies (LEA) to build capacity for teachers to use high-quality assessments to inform their science instruction. The SIPS project will play an important role in filling this immediate need by creating a bank of assessment tasks that the LEAs can use to help teachers embed assessments into their instruction.

Over the past five years I have been working closely with educators, LEAs, researchers, and state leaders to develop and implement systems of assessment that include instructionally-responsive science assessments. Drawing on my experience, I will provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols outlined in this proposal.

Thank you for the opportunity to participate in this collaboration.

Sincerely,

[redacted]

Jill Wertheim, PhD
Director of Science Assessment
Stanford Center for Assessment, Learning, and Equity

Resumes for Key Personnel

Resumes for key personnel for the SIPS project are attached below.

Rhonda True
301 Centennial Mall South
Lincoln, NE 68508
(402) 471-2947
rhonda.true@nebraska.gov

CERTIFICATION

Nebraska Standard Administration Certificate
- Elementary Principal Endorsement
- Elementary Endorsement
- Early Childhood
- Early Childhood Special Education

EDUCATION

University of Nebraska, Lincoln, Nebraska
- Educational Administration Certificate 2009

University of Nebraska, Lincoln, Nebraska
- Master of Education in Curriculum & Instruction 1989

Kearney State College (UNK), Kearney, Nebraska
- Bachelor of Arts in Elementary Education
- Specialization areas of Early Childhood/
- Early Childhood Handicaps 1983

AREAS OF EXPERTISE AND INTEREST

Grant Management	Communication
School Improvement	Instructional Strategies
Team Building	Collaboration
Strategic planning/structures	Assessment
Data Analysis	Professional Development

PROFESSIONAL EXPERIENCE

Nebraska Department of Education, Statewide Assessment
- Enhanced Assessment Grant coordinator 2017-present
- Interim NAEP State Coordinator 2019-present

Pershing Elementary, Lincoln Public Schools 2012-2017
- Principal

Prescott Elementary, Lincoln Public Schools 2009-2012
- Assistant Principal

Elliott Elementary, Lincoln Public Schools 2008-2009
- Instructional Coordinator

Rousseau Elementary & Lux MS, Lincoln Public Schools 1986-2008
- Team Leader
- Teacher

Newell Elementary, Grand Island Public Schools 1983-1985
- Teacher

GRANT MANAGEMENT SKILLS_____

- Develop and review theory of action to support the grant work and move it forward
- Collaborate with stakeholders and project partners to develop and seek input
- Organize ongoing collaborative meetings with NDE staff and educators
- Manage deliverables on a monthly and annual basis
- Invoice deliverables monthly
- Communicate to the field
- Participate in status communication with grant partners by phone and email
- Report to grantor quarterly and annually
- Attend and lead professional growth related to content impacting the project
- Monitor and communicate project timelines
- Present at national conferences regarding the project

ASSESSMENT EXPERIENCES _____

- Classroom, district, and state level assessment development
- NSCAS Science Assessment pilot and field test development and cognitive labs
- State lead for NE Science Formative Assessment Development
- Assessment vendor collaboration for design and implementation
- Professional learning with focus on assessment design
- Collaboration with districts and teachers about assessment development
- Presenter at assessment conferences about principled-design approach
- Collaborator with SCILLSS project to develop assessment literacy modules
- NSCAS Summative security school visit organizer and observer
- NSCAS-Science achievement level descriptors NDE lead
- Nebraska Assessment Accountability Advisory Committee
- Nebraska Technical Advisory Committee
- Analysis of NAEP 2019 data
- Press Release planning for NAEP 2019 data
- NAEP trainings weekly on best practices and administration
- Instructional conferences with teachers to analyze student data
- Data team process in PLC grade level teams

PUBLIC SCHOOL ADMINISTRATIVE EXPERIENCES _____

- Planning for the utilization of Title I, general fund, and accountability budgets
- Plan and facilitate bi-monthly staff meetings
- Determine staffing based on district allocation
- Prepare and present data at District Instructional Conferences
- Introduce and provide staff development based on staff and student needs
- Maintain accurate records to meet district and state requirements
- Collaborate with district coaches to support staff learning
- Coordinate school team and plan for state external visitation
- Organize and coordinate building summer school
- Develop building school profile and Title I plan

PRESENTATIONS AT PROFESSIONAL CONFERENCES

- 2018 National Conference on Student Assessment Annual Conference
  - Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS): Advancing Multidimensional Science Assessment Design: A View through Two Lenses

- 2018 Nebraska Association for Middle Level Education Professional Development
  - Introduction to College and Career Ready Science Standards

- 2018 National Council on Measurement in Education Classroom Assessment Conference
  - SCILLSS: Implementation and Use of Results of Self-Evaluation Tools for Assessment Systems

- 2019 National Council on Measurement in Education Annual Meeting
  - Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS)

- 2019 National Conference on Student Assessment Annual Conference
  - SCILLSS: Advancing Multidimensional Science Assessment Design for Large-scale and Classroom Use

- 2019 Nebraska Association of Teachers of Science Annual Conference
  - SCILLSS Overview

- 2019 Northern Nebraska Network Consortium Balanced Assessment Conference
  - SCILLSS Overview

- 2020 National Conference on Student Assessment Annual Conference
  - SCILLSS: Advancing Multidimensional Science Assessment Design for Large-scale and Classroom Use

Education

Ph.D. Educational Psychology, 1996 - University of Iowa
M.A. Educational Psychology, 1994 - University of Iowa
B.A. Physical Education & Dance, 1987 - University of Iowa

Present Position

CEO & Chief Scientist, edCount, LLC
2003 – present
Founder edCount, LLC, a professional services firm specializing in education assessment, evaluation, data management, reporting, and accountability. Major projects and clients include:

Selected Recent Projects

State General and Alternate Assessment System Design (ongoing) – Test and item design advisor for several statewide assessment design and development projects. Principal Investigator for dozens of alignment studies involving general and alternate assessments. Focus on construct and content coherence in item and test design to ensure strong alignment throughout the systems.

Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS; 2017 – 2021) – Principal Investigator for a multi-state, multi-partner collaborative project to apply principled-design assessment development methods to large-scale and local science assessments. Project funded by a $4 million grant from the U.S. Department of Education, Office of Elementary and Secondary Education.

National Centers and State Collaborative Alternate Assessment Project (2010 – 2015) – Chief Validity Evaluator for a project to develop an innovative system for supporting educators who work with students with significant cognitive disabilities through professional development modules, curriculum and instruction resources, and assessment tools. Project funded by a $45 million grant from the U.S. Department of Education, Office of Special Education Programs.

Puerto Rico Policy and Technical Assistance Project (2010 – 2014) – Principal Investigator for a comprehensive system of supports for the Puerto Rico Department of Education that encompasses validity studies; policy development for Titles I and III; professional development for general educators, special educators, and educators who work with students with limited Spanish proficiency; and the development and implementation of curriculum supports that integrate content with considerations for full access to the content for students with disabilities and students with limited Spanish proficiency.

Language Instruction Educational Programs (LIEPs): Lessons from the Research and Profiles of Promising Programs (2010 – 2012) – Principal Investigator for a federally-funded project to explore the definitions and implementation of programs designed to support English learners' acquisition of English language proficiency and academic achievement. This study encompasses a major review of literature on LIEPs, up to twenty case studies of LIEP implementation across the nation, and the production of a guide to LIEPs, their implementation, and their evaluation. Project funded by a competitive contract with the U.S. Department of Education.

Evaluating the Validity of English Language Proficiency Assessments (2009 – 2011) – Principal Investigator for a project involving five state education agencies (Washington, Oregon, Indiana, Montana, and Idaho), five partner organizations (edCount, LLC, the National Center for the Improvement of Educational Assessment, UCLA, Synergy Enterprises, Inc., and PIRE), and twelve nationally recognized experts in validity theory and second language acquisition together to develop an argument-based approach to validity evaluations for the statewide English language proficiency assessments required under

Titles I and III of NCLB. Project funded by a $1.6 million grant from the U.S. Department of Education, Office of Elementary and Secondary Education.

National Evaluation of Title III (2008 – 2011) – Senior Advisor to the first federal National Evaluation of Title III. Support for this project includes management of a comprehensive literature review related to English language acquisition policy and practices as well as analysis of English language proficiency (ELP) standards, assessments, and supporting practices in all 50 states, the District of Columbia, and Puerto Rico. Supervise collection, synthesis and analysis of data for final report on standards. Provide assistance in creation and execution of protocols to collect information from state-level administrators of Title III programs. Project funded by a competitive contract with the U.S. Department of Education.

Laurent Clerc National Deaf Education Center at Gallaudet University (2008 – Present) – Policy advisor for the implementation of standards, assessment, and accountability systems under the Education of the Deaf Act. Assist Gallaudet University in establishing a partnership with the state of Ohio for sharing that state's academic standards and assessments. Provide technical assistance in the administration, scoring, and analysis of practice student assessment. Support administration and faculty in the interpretation and implementation of state standards and appropriate assessment practices for the Clerc Center student population.

State Departments of Education, State Boards of Education, and Legislative and Appointed Taskforces (multiple states including Delaware, Indiana, Connecticut, Georgia, Nebraska, Louisiana, Hawaii, Montana, Wyoming, South Dakota, Puerto Rico, District of Columbia, and others; 2003 to present) – Provide expert testimony, policy guidance, technical advice, evaluation, and other consulting services regarding the implementation of standards and assessment programs.

National Alternate Assessment Center (2007 – 2011) – Lead evaluator for evaluations in the District of Columbia and Puerto Rico on validity issues associated with the alternate academic assessments for students with significant cognitive disabilities. Project funded by $5 million grant from the U.S. Department of Education, Office of Special Education Programs.

U.S. Department of Education (1998 – 2016) – Provide guidance and consulting services on standards, assessment, and accountability for the US Department of Education, Office of Elementary and Secondary Education. Served as a Peer Reviewer of state accountability systems under NCLB and chaired the consulting team that drafted the Standards and Assessments Peer Review Guidance for NCLB in early 2003. Currently involved in reviews of several state standards and assessment systems.

National Clearinghouse for English Language Acquisition (2008 – 2009) – Co-Principle Investigator and Director of Assessment Services for the newly re-designed clearinghouse providing technical assistance support to state and local education agencies on behalf of the Office of English Language Acquisition at the U.S. Department of Education. Provided guidance and supported inter- state collaboration related to implementation of Title III requirements for English language proficiency standards and assessments, inclusion of English language learners (ELLs) in academic content assessments, accountability, program implementation, and professional development for ESL, bilingual, and foreign language educators.

Council of Chief State School Officers (CCSSO; 1999 – 2008; 2016-current) – Consulted on assessment and accountability issues with representatives of state departments of education from across the country and coordinated the state collaborative on assessments for English Language Learners. Between 2003 and 2007, co-authored five major analyses of the state NCLB accountability workbooks and amendments and a monograph on the validity of state accountability systems.

The Education Alliance at Brown (2004 – 2006) — Led the taskforce charged with developing policies, instruments, and practices for the comprehensive K-12 territory-wide assessment system for the US Virgin Islands. Worked in partnership with taskforces developing K-12 standards and accountability plans.

Prior Professional Experience

Director of Student Assessment, Baltimore City Public Schools (2002 – 2003)

Senior Research Analyst, American Institutes for Research (2000-2002)

Education Consultant, Bureau of Student Assessment and Research, Connecticut State Department of Education (1997 – 2000)

Project Director, National Evaluation Systems, Inc. (1996 – 1997)

Selected Professional Service & Honors

National Council on Measurement in Education (NCME) – Board Member

Association of Test Publishers – Chair of Education Division

AERA Division H Publication Award for Outstanding Assessment and Accountability Publication – *for SCILLSS Assessment Literacy Workbook and Self-Evaluation Protocols (2020)*

ACT, Inc. – Technical Advisory Committee (TAC) Member

Project Lead the Way – TAC Member

UK Standards and Testing Agency – TAC Member

State Education Agencies: Illinois State Board of Education Louisiana Department of Education, Montana Office of Public Instruction, South Dakota Department of Education Washington Office of the Superintendent of Public Instruction Wyoming Department of Education – TAC Member

Educational Measurement, 5th edition – Editorial Board

Educational Measurement: Issues and Practice – Editorial Board

Applied Measurement in Education – Editorial Board

NCME: Excellence in Public Communication Award Committee – Inaugural Chair (2018-2020); NCME Mission Fund – Committee Member (2016-2020); NCME Newsletter – Advisory Board

Selected Books, Journal Articles, Book Chapters, & Monographs

Forte, E. (2017). The administrator's guide to federal program for English learners, second edition. Washington, DC: LRP.

Forte, E. (2017). Evaluating alignment in large-scale standards-based assessment systems. Washington, DC: CCSSO.

Faulkner-Bond, M., & Forte, E. (2016). Assessing English learners: The promise, pitfalls, and peculiarity of assessing language minorities via large scale assessment. In C. Wells, & Faulkner-Bond, M. (Eds.), Educational measurement: From foundations to future. New York, NY: Guilford.

Quenemoen, R.F., Flowers, C., & Forte, E. (2014). *The curriculum, instruction, and assessment pieces of the student achievement puzzle.* In More Language Arts, Math, and Science for Students with Severe Disabilities (Fred Spooner, Ed). Baltimore, MD: Brookes Publishing.

Sireci, S. & Forte, E. (2012). *Informing in the Information age: How to communicate measurement concepts to education policy makers*. Educational Measurement: Issues and Practice, 31(2), 69-74.

Other Publications

Forte, E., Quenemoen, R. F., & Thurlow, M. L. (2016, January). NCSC's theory of action and validity evaluation approach (NCSC Brief #9). Minneapolis, MN: University of Minnesota, National Center and State Collaborative.

Forte, E., Kuti, L., & O'Day, J. (2012). *National evaluation of Title III implementation: A survey of states' English language proficiency standards.* Washington, DC: US Department of Education.

Selected Keynotes and Invited Presentations

Forte, E. (April, 2018). *NCME invited session: Measurement problems – A look back to help us look ahead, Session 3.* Panelist. Annual Meeting of the National Council on Measurement in Education, New York City, New York.

Forte, E. (April, 2014). *Argument in action: Implementing validity theory in the real world.* Invited presentation for the AERA Special Interest Groups (SIG) on Professional Licensure and Certification; Test Validity Research and Evaluation; and Cognition and Assessment at the Annual Meeting of the American Educational Research Association, Philadelphia, PA.

Forte, E. (August, 2013). *Evidence centered design: Principles, applications, and implications.* Invited workshop for ACT staff. Iowa City, Iowa.

Forte, E. (November, 2013). Moderator for the Debate on the use of instructional sensitivity information to select test items for state tests. First annual Instructional Sensitivity Conference, Lawrence, KS.

Forte, E. (June, 2013). *2013 Assessment Bootcamp – An Overview of the Practical and Technical Issues in Large-Scale Assessment Programs*. (Invited organizer and presenter.) Session presented at the Annual National Conference on Student Assessment, Washington, DC.

Other Selected Presentations and Conference Service

Forte, E. (April, 2019). *The SCILLSS digital workbook on educational assessment design and evaluation.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, Toronto, Canada.

Forte, E. (April, 2019). *Representing cognitive complexity in test design and evaluation.* Paper presented at the Annual Innovations in Testing Conference of the Association of Test Publishers, Orlando, FL.

Forte, E. (April, 2019). *Shifting to a design science paradigm to develop desirable, feasible, and viable tests.* Paper presented at the Annual Innovations in Testing Conference of the Association of Test Publishers, Orlando, FL.

Forte, E. (October, 2018). *Defining expectations for cognitive complexity using principled-design.* Presentation for the Technical Issues in Large-Scale Assessment State Collaborative for Assessment and Student Standards of CCSSO, Boston, MA.

Forte, E. (June, 2018). *Aligned to what: Complex content standards as targets for assessment design and alignment evaluation.* Paper presented at the CCSSO Annual National Conference on Student Assessment, San Diego, CA.

Davis-Becker, S. & Forte, E. (April, 2018). *Breaking the rules: Validation when the purpose changes but the test does not.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, New York City, New York.

Forte, E. (October, 2017). *Applications of an alignment evaluation framework.* Workshop presented at the Annual Meeting of the Northeastern Educational Research Association, Trumbull, CT.

Forte, E. (June, 2017). *Supporting choices in constructing an effective validity argument.* Paper presented at the CCSSO Annual National Conference on Student Assessment, Austin, TX.

Forte, E. (April, 2017). *Development and implementation of a comprehensive alignment evaluation framework.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, San Antonio, TX.

Forte, E. (April, 2017). *NCME invited session: Peer review under the Every Student Succeeds Act of 2015.* Organizer, chair, and panelist. Annual Meeting of the National Council on Measurement in Education, San Antonio, TX.

Forte, E. (June, 2016). *Managing test administration Irregularities: Support and advice from those with first-hand experience*. Paper presented at the CCSSO Annual National Conference on Student Assessment, Philadelphia, PA.

Forte, E. (June 2016). *Opportunities in ESSA: Holistic approaches to enhancing education and workplace success for all students*. Paper presented at the CCSSO Annual National Conference on Student Assessment, Philadelphia, PA.

Forte, E. (April, 2016). *Content-based evidence and score validation: Challenges and opportunities in interpreting the test standards.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, Washington, DC.

Forte, E. (April, 2016). *Do Large Scale Performance Assessments Influence Classroom Instruction? The NCSC Perspective*. Paper presented at the Annual Meeting of the National Council on Measurement in Education, Washington, DC.

Forte, E. (April, 2015). *US federal peer review in policy and practice*. Paper presented at the Annual Meeting of the National Council on Measurement in Education, Chicago, IL.

Forte, E. (April, 2015). *Using response process evidence to evaluate language demands in academic assessments.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, Chicago, IL.

Forte, E. (April, 2015). *Integrating the evidence: the NCSC validity evaluation in year 5.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, Chicago, IL.

Forte, E. (April, 2015). *Assessing diverse learners.* Discussant for session at the Annual Meeting of the National Council on Measurement in Education, Chicago, IL.

Forte, E. (April, 2015). *Contemporary problems in educational measurement.* Actor, dancer, ruffian in the satirical session at the Annual Meeting of the National Council on Measurement in Education, Chicago, IL.

Forte, E. (October, 2014). *Integrating Embedded Assessment, Curriculum Design, and Professional Development to Support Student Learning.* Paper presented at the Annual Meeting of the Northeastern Educational Research Association, Trumbull, CT.

Forte, E. (April, 2014). *Validity Evaluation in the NCSC alternate assessment context.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, Philadelphia, PA.

Forte, E. & Perie, M. (November, 2013). *Considering instructional sensitivity in the validity evaluation process.* Paper presented at the first annual Instructional Sensitivity Conference, Lawrence, KS.

Forte, E. & Greninger, E. (October, 2013). *Designing curriculum with the individual learner in mind.* Paper presented at the World Conference on Learning, Teaching and Educational Leadership, Barcelona, Spain.

Forte, E. (June, 2013). *Incorporating a theory of action into validation.* Paper presented at the CCSSO Annual National Conference on Student Assessment, Washington, DC.

Forte, E. (June, 2013). *Transitioning assessment systems.* Paper presented at the CCSSO Annual National Conference on Student Assessment, Washington, DC.

Forte, E. (April, 2013). *Re-conceptualizing alignment in the evidence-centered design context*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

Forte, E. (April, 2013). *Evaluating alignment for assessments developed using evidence-centered design.* Paper presented at the Annual Meeting of the National Council on Measurement in Education, San Francisco, CA.

Education

M.A. Curriculum and Instruction, 2006, Michigan State University

B.A. Elementary Education, minors in English and Geography, 2002, Michigan State University

Present Position

Senior Associate, edCount, LLC
2013 – present

Contribute to edCount's organizational objectives through intellectual engagement, technical expertise, and management of staff and company resources. Responsibilities include managing projects and managing the work of junior staff; planning and implementing methods, techniques, and skills to complete projects in a timely and cost-efficient manner; preparing high-quality reports and other outputs; and developing corporate knowledge and knowledge of individual program areas and projects.

Projects

New York State Assessment Development – English Language Arts: New York State Department of Education (NYSED)

Senior ELA Content Specialist and Content Development Manager in support of technical assistance and advisory activities to Questar Assessment, Inc. in relation to the NYS general assessment in grades 3-8 in ELA. Provide leadership and oversight to item development activities, including facilitating the design and implementation of Virtual Item Writing Trainings, and in-person Item-Writing Workshops for educators, and contributing to and managing the revision of educator-created items by edCount content experts.

Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS)

Deputy Project Director and Reporting Lead for a three-year multi-state Enhanced Assessments Grant program; Provide oversight to project phases and assist in the application of a principled-design approach to establish a foundation from which a broad range of valid enhanced science assessments can be built, evaluated, and shared across states, local education agencies, schools and classrooms.

Wisconsin ACT Alignment Study – In October 2017, served as National Expert Panelist in an independent study to evaluate the alignment between the Wisconsin state standards in English language arts and the ACT test.

Indiana Reading Evaluation And Determination (IREAD-3) Alignment Study and Cut-Score Validation – Served as Project Director and Lead Facilitator; led the design of an independent study to evaluate the alignment of the IREAD-3 assessment to the target Indiana standards and the adequacy of the cut scores that differentiate among the achievement standard levels; provided oversight for qualitative and quantitative analyses and facilitated the development of a summary report of findings.

Mississippi Subject Area Testing Program Alignment Evaluation – Served as Project Manager; assisted in the design and development of item review procedures, templates, and trainings to evaluate the alignment and validity of Mississippi's Subject Area Testing Program (SATP2) in English II and Algebra I; conducted test-level analysis of alignment between blueprint, test form, and item specifications; conducted qualitative and quantitative analyses and developed report of findings.

New York State Assessment System Alignment Evaluation – Served as Project Manager; assisted in the design and development of item review procedures, templates, and

trainings to evaluate the alignment and validity of the New York State Assessment System in English language arts and mathematics at grades 3-8; conducted test-level analysis of alignment between blueprint and test form; conducted qualitative and quantitative analyses and developed report of findings.

K-12 OER Collaborative's ELA K-2 Rapid Prototype Curriculum Project – Served as Project Director for the development of a technology-enhanced curriculum package for grade 1 in English language arts. Created and monitored timelines, development processes and workflows, and consultant contracts. Developed and facilitated three full-day training sessions on topics including Understanding by Design, research-based literacy practices, the key shifts in the CCSS, text complexity considerations, learning progressions, differentiation, etc. Served as senior reviewer of all curriculum and assessment materials. Developed task models and templates for the development of digital, interactive components to the curriculum package.

Standards and Assessment Implementation Technical Assistance: Puerto Rico Department of Education – Served as Curriculum and Professional Development Specialist for a comprehensive reform of the standards, curricula, and performance task assessments to support technical assistance for the Puerto Rico Department of Education. Developed and implemented trainings for contractors in the development of curricula and assessments using a backward design approach. Worked collaboratively with colleagues to develop an integrated assessment model using dichotomous scoring rubrics aligned to curriculum map standards and acquisition goals.

Professional Experience

ELA Senior Content Specialist: Assessment and Information Division, Pearson
2011 – 2013

ELA Content Lead for The Partnership for Assessment of Readiness for College and Careers (PARCC) assessment, grades 3-8 passage development and grades 3-5 item development. Coordinated and managed the development of passages and items. Provided senior review and approval of passages and items. Created passage development training and submission materials. Planned and facilitated remote and on-site passage and item development trainings with external vendors. Conducted ongoing bank analyses and implemented passage development plans. Facilitated remote and on-site passage and item review meetings with the PARCC Leadership Team and state educators. Developed commissioned reading passages and items and built test forms for the Florida Comprehensive Assessment Test (FCAT).

K-12 Language Arts Content Specialist: Standards and Assessment Division, Wyoming Department of Education
2008 – 2011

Consulted and coordinated with assessment vendor in development, refinement, and deployment of assessments and assessment items in the areas of reading and writing. Revised state writing scoring rubrics, grades 3-8 and 11. Developed item writing specifications and style guide for multiple choice writing items. Assisted assessment vendor in development of online scorer training system and response annotations. Developed and refined instruction and assessment resources for Wyoming educators.

Coordinated projects with the assessment vendor, including the Proficiency Assessments for Wyoming Students (PAWS) Rangefinding Project, PAWS Writing Scoring Institute, PAWS Traffic Signal Project, and PAWS Item, Data, and Bias Reviews. Participated in the National Assessment of Educational Progress (NAEP) Reading and Writing Item Reviews, Washington, D.C. Participated in the PAWS-Alternate Reading and Writing Item Reviews.

Planned and facilitated statewide professional development workshops and annual meetings in reading and writing. Member of the Wyoming Standards Revision Steering

Committee. Facilitated the revision of the Wyoming English Language Arts Content and Performance Standards.

Second Grade Teacher, Vera Ralya Elementary School
2007 – 2008

Awarded technology mini-grant for use of interactive Smart Board and projector in classroom. Member of the Language Arts and Social Studies District Curriculum Mapping Committees.

Grades 1-3 Teacher, Plymouth Elementary School
2004 – 2007

Worked collaboratively with team teaching partners to co-plan and co-teach units and lessons for three grade levels and various multi-age groupings. Assessed academic and social progress of 69 students.

Professional Affiliations & Organizations

National Science Teachers Association (NSTA) (2003-2004)

Michigan Education Association (MEA) (2003-2008)

Michigan Reading Association (MRA) (2005-2008)

The Assembly of State Coordinators of English Language Arts (ASCELA) (2008-2011)

Honors & Awards

ARC Award for Diversity and Creativity in the Classroom (2005)

Dean's List, Michigan State University (1998-2002)

Mortar Board National Society Member, Michigan State University (1998-2002)

National Society of Collegiate Scholars Member, Michigan State University (1998-2002)

Certifications

Michigan Professional Teaching Certificate (K-5 all subjects; 6–8 English; Geography) (2004-2015)

Baldrige National Quality Performance Excellence Systems Training (2009, 2010)

Organizational Assessment Training, July 2009

DIBELS Training (2004)

Michigan Literacy Progress Profile Certification Training (2003)

Publications & Presentations

Everson, H., Rutstein, D., Summers, E., & Buchanan, E. (July, 2018). *Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores Project (SCILLSS). A Principled Approach to Designing Three-dimensional Science Assessment Tasks.* Lincoln, NE: Nebraska Department of Education.

Forte, E., Summers, E., & Buchanan, E. (November, 2017). *Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores Project (SCILLSS). Theory of Action Development Guide.* Lincoln, NE: Nebraska Department of Education.

Forte, E., Sireci, S., Buchanan E., Deters, L., & Colvin K. (September, 2017). *Alignment Evaluation and Cut Score Validation Study for the IREAD-3 Reading Assessment.* Submission on behalf of edCount, LLC to the Indiana Department of Education. Study Report.

Forte, E., Towles, E., Greninger, E., Buchanan, E., & Deters, L. (February, 2017) *Evaluation of the Alignment Quality in the Georgia Milestones Assessment System in ELA, Mathematics, Science, and Social Studies.* Submission on behalf of edCount, LLC to the Georgia Department of Education. Study Report.

Greninger, E. & Buchanan, E. (December, 2016). *Literacy for ALL Students.* Presentation at the Learning Forward Annual Conference, Vancouver, BC.

Greninger, E., Buchanan, E., Herrera, B., Deters, L., & Perkins, A. (February, 2016) *Mississippi Subject Area Testing Program English II & Algebra I Item-Level and Test-Level Report.* Submission on behalf of edCount, LLC to Questar Assessment, Inc. and Mississippi Department of Education. Study Report.

Greninger, E., Buchanan, E., Herrera, B., Deters, L., & Perkins, A. (January, 2016). *New York State Testing Program Grades 3-8 English Language Arts & Mathematics Item-Level and Test-Level Report.* Submission on behalf of edCount, LLC to Questar Assessment, Inc. and New York Department of Education. Study Report.

Greninger, E. & Buchanan, E. (December, 2014). *Redesigning an Instructional System to Promote Higher Expectations.* Presentation at the Learning Forward Annual Conference, Nashville, TN.

Education

M.A. English, Multicultural and Transnational Literature, 2013, East Carolina University
B.S. Secondary English Education, 2008, East Carolina University

Present Position

Associate and ELA Specialist, edCount, LLC
2018 – Present

Contributes to edCount's organizational objectives through intellectual engagement, and English language arts (ELA) content expertise; Supports senior-level staff in ELA assessment development, adhering to standards-based and project specific guidelines; Manages projects and the work of junior staff; Develops corporate knowledge and knowledge of individual program areas and projects

Projects

New York State Assessment Development – English Language Arts and Mathematics: New York State Department of Education (NYSED)

Utilized expertise as ELA Content Specialist to provide New York educators with specialized support in understanding content and interpreting Next Generation State Standards; Participated in the development, presentation, and facilitation of educator training in the development of English language arts items for grades 3 – 8, both online and in-person; Utilized webinar participants' evaluation survey data, presenter feedback, and leadership experience to enhance quality of future webinar training sessions, ensuring effective focus and efficient delivery to meet participant needs; Managed facilitation of educator training at item writing workshops including developing a facilitation plan designed to promote efficient movement through the item writing process for on-site stakeholder meetings and support collaborative environment for educators; Revised assessment materials including item specification documents and test blueprints; Developed and revised assessment items including multiple-choice and constructed-response for large-scale summative assessments that are aligned to standards and item specification documents; Provided feedback and consultation to NYSED with respect to ELA development and reconciliation of educator reviews.

Indiana Department of Education (IDOE) Assessment and Professional Development Support – ISTEP+, ILEARN, and I AM

Served as Project Lead and Professional Development and Assessment Training Lead in the online professional learning sessions that guide educators toward effective teaching practices, supportive leadership, and improved student results; Participated in the development and presentation of assessment literacy training for educators and administrators, specializing in topics concerning the purposes and uses of assessment data and action steps for utilizing summative data and reports; Oversaw and contributed to the design and implementation of the online platform and presentations designed to provide teachers with a forum to engage their colleagues in discussion on instructional best practices; Utilized webinar participants' evaluation survey data, presenter feedback, and leadership experience to enhance quality of future webinar training sessions ensuring effective focus and efficient delivery to meet participant needs; Managed facilitation of educator training at item writing workshops, both online and in-person; Utilized expertise as ELA Content Specialist to provide IDOE with additional content support including leading on-site and virtual training of ELA educators to develop resources and test items and to interpret standards and item specifications; Monitored participant progress in content development through virtual meetings facilitating fidelity to Indiana state standards and specifications and managing adherence to deadlines for deliverables.

Louisiana's Educational Assessment Program Connect Assessment System for Students with Cognitive Disabilities (LEAP)

Utilized expertise as ELA Content Specialist to compose literature and informational text reading passages and item sets for LEAP Connect Practice Test at three levels of complexity (i.e. Tiers 1-3); followed item specification and applied specific criteria based on alternate achievement standards (AA-AAS); formatted passages and items according to LDOE LEAP Connect requirements

Assessment Alignment Evaluations

Facilitated virtual and in-person alignment evaluation workshop with expert panelists in various content areas to collect data for use in evaluating the quality of alignment to ensure that the assessments yield meaningful, useful information for its stakeholders; Guided the group process and discussion, documented the group discussions, answered questions to facilitate the ratings, and confirmed that all ratings were captured appropriately; Worked independently and collaboratively to review these materials to ensure a foundational understanding of the assessment system and each individual EOC assessment in preparation for the workshop. Current and previous alignment studies include:

- Georgia Milestones Assessment System for Georgia Department of Education (GaDOE)
- ILEARN and I AM Assessments for Indiana Department of Education (IDOE)
- Tennessee Comprehensive Assessment Program (TCAP) End of Course Assessments in Algebra I, English I, and Biology
- West Virginia's Alternate Academic Achievement Standards and the Dynamic Learning Maps Essential Elements for West Virginia Department of Education (WVDE)

Professional Experience

Communications Coordinator, Trillium Health Resources
2017 – 2018

Wrote and edited copy for informational and educational print material, media alerts and news releases, internal and external publications reflecting company policies; Created content for web videos and social media, clearly explaining healthcare issues; Maintained company social media and media presence.

Brunswick County Schools
2015 – 2017

Served as an ELA curriculum specialist and instructional coach for the district; Managed and maintained curriculum and assessments for grades 6 through 8 in alignment with district expectations and the North Carolina Standard Course of Study for ELA; Facilitated professional development across the district for classroom teachers focusing on research-based instructional best practices; Analyzed instructional practices through classroom observations and data analysis, providing feedback to improve upon those practices; Developed and managed a district-wide resource-share using Google Drive to support vertical and horizontal alignment of classroom instruction, resources, and assessments; Designed district interim assessments for ELA in grades 6 through 8 and led performance data evaluation PLCs with middle grades ELA educators throughout the district; Served as Project Developer and Lead for the district's 2017 Teacher Academy ensuring that the project met the standards, goals, and expectations of district and community stakeholders; Managed and oversaw productivity of multiple groups of stakeholders to ensure that project goals were achieved; delegated responsibilities to participants according to skill and strength; monitored workflows and maintained a flexible timeline as needed; handled administrative tasks related to success of project.

North Carolina Department of Public Instruction
2012 – 2017

Provided support to the North Carolina Department of Public Instruction (NCDPI) in multiple contracted positions; Developed, researched, and wrote curriculum instruction guidelines as a Digital Support Writer; Collaborated in state-wide lesson plan development initiatives, contributing to a bank of resources designed to support vertical and horizontal alignment of ELA instruction in grades 10 and 12 across the state; Provided teachers with formative assessment strategies; Constructed lesson plans aimed toward extending the depth and breadth of the North Carolina Standard Course of Study for ELA as part of state-wide initiative to provide a database of exemplar lessons for AIG students in grade 10.

Pender County Schools
2008 – 2015

Instructed the North Carolina Standard Course of Study for ELA for grades 9 – 12 using research-based best practices for students with diverse needs including exceptional children and English Language Learners; Collaborated with colleagues across the district to develop vertically aligned unit plans and assessments and share resources; Instructed students in Alternate Learning Programs to support the district graduation rate; Provided leadership as department chair supporting the department implementation of district initiatives; Served as on-campus expert in Common Core State Standards (CCSS) and Positive Behavior Interventions and Supports (PBIS); Supported implementation of systemic professional development plans including focuses on qualitative and quantitative data, PLDs, and formative and summative assessments based on school-site needs

Professional Affiliations & Certifications

North Carolina Professional Educator's License, Highly Qualified 9 – 12 English Language Arts

National Council of Teachers of English (NCTE)

Honors & Awards

North Carolina Teaching Fellows Program, East Carolina University (2004 – 2008)

Presentations

Coleman, C., Cromartie. K, & Melvin, A. (2013, March). #collaboration: The Power of Using Science and English TOGETHER. North Carolina Association for the Gifted and Talented, Winston-Salem, NC.

Education

M.S. Zoology, 1996, University of Wyoming
B.S. Secondary Education – Science, 1998, University of Wyoming
B.S. Wildlife Conservation Management, 1990, University of Wyoming

Present Position

Senior Associate
2011 – present

Contribute to edCount's organizational objectives through intellectual engagement, technical expertise, and management of staff and company resources. Responsibilities include directing projects and managing the work of junior staff; planning and implementing methods, techniques, and skills to complete projects in a timely and cost-efficient manner; preparing high-quality reports and other outputs; developing corporate knowledge and knowledge of individual program areas and projects.

Current and Previous Projects

Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science and Assessment Scores (SCILLSS) Project – Serve as a Senior Project Lead and Assessment and Content Specialist to develop NGSS and state science standards crosswalk, claims, and measurement targets. Utilize Evidence-Centered Design assessment tools for creation of classroom ad large-scale assessments including task templates, design patterns, exemplar tasks, rubrics, and exemplar responses. Plan development and facilitation of state-based professional development. Provide technical documentation of all aspects of project development.

Mississippi Assessment Program – Alternate (MAP-A) Mississippi Department of Education – Serve as a Senior Project Lead and Assessment and Content Specialist to develop and implement the MAP-A including components of an alternate assessment system, innovative assessment design, test blueprints, item and passage development guidelines in English language arts (reading, writing, language) and item development guidelines in mathematics and science for grades 3 – 8 and high school. Facilitate stakeholder meetings including development of assessment components, content and bias reviews, and item development.

New York State Assessment Development – Mathematics, New York State Department of Education – Serve as a Senior Project Lead and Assessment and Content Specialist; Train and lead educators in the development of mathematics items for grade 3 – 8, including facilitating both online and in-person trainings, and managing educator-created content. Facilitate on-site stakeholder meetings including development of assessment components, and content and bias reviews. Provide feedback and consultation to NYSDE with respect to mathematics development and reconciliation of educator reviews. Previously, developed mathematics item specifications for grades 3 – 8 aligned to the New York State P-12 Common Core Learning Standards. Served as a developer, facilitator, panelist, and contributor to technical documentation of alignment studies for mathematics and English language arts. Provided expertise and guidance as a technical advisor on the assessment system and its contents.

Studies of General and Alternate Assessment Alignment – Serve as a Senior Advisor and Assessment Specialist; act as a facilitator, panelist, and developer of technical documentation of alignment studies for general and alternate assessments of English language arts, mathematics, social studies, and science for various entities including NCSC, PARCC, and several state departments of education.

South Dakota Department of Education – Serve as a Senior Project Lead and Alternate Assessment Specialist to develop science core content connectors (CCCs) that reflect high expectations for students with the most significant cognitive disabilities and

describe academic targets that pinpoint starting points for instruction, instructional sequence within a grade and across grade bands (k-5, 6-8, & high school), and inform classroom and accountability assessments to promote a fully aligned system of content, instruction and assessment. Prepare materials, train, and facilitate groups of expert panelists including content experts, assessment experts, special educators, and state leaders, in grade span groups for K-5, 6-8, and 9-12 to analyze the South Dakota Science Standards and finalize the CCCs.

California Department of Education – Served as a Senior Project Lead and Assessment Specialist working to develop the California Next Generation Science Standards (NGSS) Core Content Connectors for use with the California NGSS Alternate Assessment Program. The Core Content Connectors, which were developed with attention to vertical and horizontal articulation, will be used to maintain fidelity to the California Next Generation Science Standards (NGSS) Performance Expectations, defined for kindergarten through high school in classrooms serving the student population participating in the alternate assessment.

Tennessee Comprehensive Assessment Program – Alternate (TCAP-Alt) for Science and Social Studies, Tennessee Department of Education – Serve as Senior Project Lead and Alternate Assessment Specialist working towards the development of social studies and science alternate assessments for grades 3 – 8 and high school including determination of prioritized assessment content and development of the test design, test blueprints, item development guidelines, item development, and curriculum and instruction materials. Previously, facilitated stakeholder meetings in both face-to-face and virtual settings, and developed a series of content modules for educators. The modules support delivery of science and social studies instruction to provide appropriate levels of challenge and rigor to students with significant cognitive disabilities.

Education for the Deaf Act (EDA) Implementation Technical Assistance: the Laurent Clerc National Deaf Education Center, Gallaudet University, Washington, D.C. – Serve as Senior Curriculum Advisor supporting the Laurent Clerc National Deaf Education Center's efforts in curriculum and professional development and compliance with assessment and accountability regulations under No Child Left Behind (NCLB) and the Education for the Deaf Act (EDA). Assist with edCount's work providing technical assistance to the Clerc Center as they transition to the Common Core State Standards, including curriculum alignment and professional development to support curriculum implementation.

National Center State Collaborative (NCSC) General Supervision Enhancement Grant – Served as Senior Curriculum Advisor and Alternate Assessment Specialist working directly with UNC Charlotte on the mathematics and ELA content work for development of the curriculum and instructional resource materials and development of the core content connectors; provided support and collaboration with other organizational partners including SRI International, University of Kentucky, and the National Center for the Improvement of Educational Assessment, Inc. and the assessment development teams and item writing/summative assessment vendors; participated in all management team, staff leadership team, and cross workgroup meetings; and coordinated with the validity evaluation team. Supported the development and writing of technical documentation, standard setting performance level descriptors in mathematics and English language arts for grades 3 – 8 and high school, individual student report content and interpretive guides, and multiple technical reports related to a variety of project-related activities.

Charlotte-Mecklenburg Schools Item Development Project – Served as Project Director responsible for managing budget, staff, timelines, and quality for the creation of

program evaluation tests in 32 subject areas for CMS. Managed the test construction process including item and blueprint development, item review, and production of test materials; managed item writers and liaised with CMS Executive Director of State and Federal Programs to ensure deliverables met client specifications.

Puerto Rico Department of Education Curriculum Development – Served as Senior Curriculum Advisor in the evaluation of materials created for the PRDE in the areas of K-12 mathematics and science curriculum development to improve educational standards and student achievement.

Pruebas Puertorriqueñas de Evaluación Alterna (PPEA), Puerto Rico Department of Education– Served as Senior Curriculum Advisor in the development and evaluation of materials created for the PRDE in the area of students with significant cognitive disabilities. The Assessment Training Modules and materials development for grades 3-11 were designed to improve educational opportunities and student achievement in the Pruebas Puertorriqueñas de Evaluación Alterna (PPEA).

Professional Experience

Director of Assessment, Wyoming Department of Education (WDE)
March 2011 – August 2011

Director of Test Development and Research, Wyoming Department of Education (WDE)
2009 – 2011

Assistant Director of Assessment, Wyoming Department of Education (WDE)
2007 – 2009

Science and Mathematics Content Specialist, Wyoming Department of Education (WDE)
2004 – 2007

Lecturer, Physics & Astronomy Department, University of Wyoming
2003 – 2004

Adjunct Instructor – Mathematics and Science courses, Laramie County Community College
1999 – 2003

Mathematics and Science Teacher – Whiting Alternative High School, Grades 9-12, Albany County School District #1
1998 – 2003

Professional Affiliations & Organizations

National Council on Measurement in Education (NCME)

American Educational Research Association (AERA)

Council for Exceptional Children (CEC)

Selected Publications & Presentations

Deters, L., Nebelsick-Gullett, L., Turner, C., Herrera, B., & Towles, E. (2016, April). Evaluating the Degree of Coherence Between Instructional Targets and Measurement Models. National Council on Measurement in Education, Washington, D.C.

Herrera, B., Turner, C., Nebelsick-Gullett, L., & Scott, L. (2016, April). Consideration of the Learner, the Teacher, and Item Performance. National Council on Measurement in Education, Washington, D.C.

Turner, C. & Herrera, B. (2016, April). Writing Instruction: What We Know and Still Need to Know. Council for Exceptional Children, St. Louis, MO.

Herrera, B., Turner, C., Quenemoen, R., & Thurlow. M. (2015, November). NCSC's age- and grade-appropriate assessment of student learning. NCSC Brief, Number 6.

Davidson, A., Hagge, S., Herrera, B., Turner, C., Egan, K., Flowers, C., Quenemoen, R., & Thurlow, M. (2015, April). Incorporating accessibility and complexity concepts into test specification and anchor set selection for alternate assessments of alternate achievement standards. American Educational Research Association, Chicago, IL.

Flowers, C.P., & Herrera, B. (2015, April). Building from the ground up: A writing assessment story (Symposium: Writing for students with significant cognitive disabilities: It's more than just writing their names). American Educational Research Association, Chicago, IL.

Flowers, C., Herrera, B., Turner, C., Towles-Reeves, L., Davidson, A., Hagge, S., Thurlow, M., & Quenemoen, R. (2015, April). Developing a large-scale assessment using evidence-centered design: Did it work? National Council on Measurement in Education, Chicago, IL.

Hagge, S., Davidson, A., Herrera, B., Turner, C., & Thurlow, M. (2015, April). Item construct maintenance when varying levels of support and complexity. National Council on Measurement in Education, Chicago, IL.

Herrera, B. (2014, June). *Using performance standards in next generation alternate assessments: connecting instruction and assessment.* Presentation at the annual meeting of the Council of Chief State School Officers, New Orleans, LA.

Herrera, B. (2014, June). *While this may be true, the stepping stones to transition are not enough*. Presentation at the annual meeting of the Council of Chief State School Officers, New Orleans, LA.

Herrera, B. (2013, April). *Changing traditional item review processes to review ecd-based items.* (Symposium: *Everything changes: implementing evidence-centered design to address large-scale assessment challenges*. American Educational Research Association, San Francisco, CA.

Wakeman, S., Turner, C., Herrera, B., & Lee, A. (2013, April). *Graduated understandings for instruction of students with significant disabilities: Movement toward common core state standards.* Presentation at the annual meeting of the Council for Exceptional Children, San Antonio, TX.

Mueller, C., Herrera, B., & King, K. (2012) *Standards: Revisited, Re-evaluated, and just Refurbished*. Presentation at the annual meeting of the Association of Test Publishers Innovations in Testing, Palm Springs, CA.

Kettler, R.J., Dickenson, T.S., Bennett, H.L., Morgan, G.B., Gilmore, J.A., Beddow, P.A., Swaffield, S., Turner, L., Herrera, B., Turner, C., & Palmer, P.W. (2012). Enhancing the accessibility of high school science tests: A multi-state experiment. *Exceptional Children, 79*(1), 91-106.

Herrera, B. (2010). *In Pursuit of PAWS Instructional Sensitivity or...nothing specific or too very Scientific*. Presented at CCSSO, Detroit, MI.

Turner, C. & Herrera, B. (2005 – 2010). *Technical Manuals for the Proficiency Assessments for Wyoming Students – Alternate*. Contributions on behalf of Wyoming Department of Education, Harcourt Assessment, Inc. and Questar Assessment, Inc. Internal Reports.

Herrera, B. & Turner, C. (2005 – 2010). *Technical Manuals for the Proficiency Assessments for Wyoming Students*. Contributions on behalf of Wyoming Department of Education, Harcourt Assessment, Inc. and Pearson Assessment, Inc. Internal Reports.

Karvonen, M., et al. (including B. Herrera) (2010). *Correlates of Student Performance on an Alternate Assessment based on Alternate Achievement Standards (AA-AAS):*

The Role of Learner Characteristics and the Instructional Program. Presented at American Educational Research Association (AERA) Annual Meeting, Denver, CO.

Herrera, B., Bechard, S., Almond, P., Karvonen, M., Wakeman, S., Turner, C., Bowen, T., Turner, L., & Flowers, C. (2009, June). *Hitting a Moving Target: A Discussion of Ten Alignment Studies for AA-AAS.* Presented at CCSSO, Los Angeles, CA.

Turner, C. & Herrera, B. (2009, June). State Academic Learning Links with Self-Evaluation for Alternate Assessment. Wyoming Contribution to *SALLSA Newsletter*, pp. 7-8.

Education

B.S. Special Education, *magna cum laude*, 1977, James Madison University

Present Position

Senior Associate, edCount, LLC
2011 – present

Contribute to edCount's organizational objectives through intellectual engagement, technical expertise, and management of staff and company resources. Responsibilities include directing projects, developing innovative assessment designs, managing the work of junior staff; planning and implementing methods, techniques, and skills to complete projects in a timely and cost-efficient manner; preparing high-quality reports and other outputs; developing corporate knowledge and knowledge of individual program areas and projects.

Current and Previous Projects

Studies of General and Alternate Assessment Alignment – Serves as a Senior Lead and Assessment Specialist. Acts as a facilitator, panelist, and developer of technical documentation of alignment studies for general and alternate assessments of English language arts, mathematics, social studies, and science for various entities including NCSC, PARCC, and several state departments of education.

Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science and Assessment Scores (SCILLSS) Project – Serves as a Senior Project Lead and Assessment and Content Specialist. Collaborates with multiple organizations and state partners to develop a coherent assessment system based on a project- and state-specific Theory of Action (ToA). Develops NGSS and state science standards crosswalk, claims, and measurement targets. Utilizes Evidence-Centered Design principles and assessment tools to create classroom and large-scale assessments including task models, design patterns, exemplar tasks, rubrics, and exemplar responses. Plans development and facilitation of state-based professional development. Provides technical documentation of all aspects of project development.

New York State Assessment Development – Mathematics: New York State Department of Education (NYSDE) – Serves as a Senior Project Lead and Assessment and Content Specialist. Trains, oversees, and guides educator groups in the development of mathematics items for grades 3 – 5 aligned to the New York State P-12 Common Core Learning Standards. Facilitates on-site stakeholder meetings including development of assessment components and content and bias reviews. Provides feedback and consultation to NYSDE with respect to mathematics development and reconciliation of educator reviews.

Mississippi Assessment Program – Alternate (MAP-A) Mississippi Department of Education – Served as a Senior Project Lead and Assessment and Content Specialist to provide guidance and technical assistance to the Mississippi Department of Education. Developed and implemented the Mississippi Academic Assessment Program – Alternate (MAAP-A) including components of a coherent, alternate assessment system, innovative assessment design, claims, measurement targets, test blueprints, item- and passage-development guidelines in English language arts (reading, writing, language) and item development guidelines in mathematics and science for grades 3 – 8 and high school. Facilitated stakeholder meetings including development of assessment components, content and bias reviews, and item development.

California Department of Education – Served as a Senior Project Lead and Alternate Assessment Specialist to develop the California Next Generation Science Standards

(NGSS) Core Content Connectors for use with the California NGSS Alternate Assessment Program. Developed the Core Content Connectors, with attention to vertical and horizontal articulation; addressed fidelity to the California Next Generation Science Standards (NGSS) Performance Expectations defined for kindergarten through high school to provide appropriate levels of challenge and rigor to students with significant cognitive disabilities and to align with the California Assessment Framework. In addition, developed sets of low, middle, and high complexity scenario/investigation-based alternate field test assessment tasks for elementary, middle, and high school for the California Alternate Assessment for Science.

South Dakota Department of Education – Served as a Senior Project Lead and Alternate Assessment Specialist. Developed science core content connectors (CCCs) reflecting high expectations for students with the most significant cognitive disabilities and that describe academic targets that pinpoint starting points for instruction, instructional sequence within a grade and across grade bands (K-5, 6-8, & high school), and inform classroom and accountability assessments to promote a fully aligned system of content, instruction and assessment. Prepared materials, trained, and facilitated groups of expert panelists including content experts, assessment experts, special educators, and state leaders, in grade span groups for K-5, 6-8, and 9-12 to analyze the South Dakota Science Standards and finalize the CCCs.

United States Virgin Island Department of Education – Served as a Senior Project Lead and Alternate Assessment and Curriculum and Instruction Specialist for students with the most significant cognitive disabilities. Developed and implemented professional development opportunities for educators in the form of interactive workshops to result in actionable job-embedded practices, tools, and resources including development of academic lesson plans, role of communication and building students' communicative competence, practice and incorporation of evidence-based instructional approaches and materials, and promotion of access to the general curriculum.

Tennessee Comprehensive Assessment Program – Alternate (TCAP-Alt) for Science and Social Studies Tennessee Department of Education – Served as Senior Project Lead and alternate assessment specialist for development of social studies and science alternate assessments for grades 3 – 8 and high school including determination of prioritized assessment content and development of the test design, test blueprints, item development guidelines, item development, and technical documentation. Facilitated face-to-face stakeholder meetings. Developed a series of curricular materials for educators including content modules to support delivery of science and social studies instruction based on grade-level standards using evidence-based strategies to provide appropriate levels of challenge and rigor to students with significant cognitive disabilities. Developed science and social studies assessment modules to inform item developers of the knowledge and skills assessed by the TCAP/Alternate (TCAP/Alt) Assessment for Social Studies to create assessment items that are based on grade-level topics and academic content, allow students with varying degrees of understanding to demonstrate what they know and can do at each grade level, and are accessible to a full range of students with varying characteristics. Developed science and social studies item writer training tools, including training modules and ancillary materials, based on the content of the assessment modules.

Education for the Deaf Act (EDA) Implementation Technical Assistance, Validity Study, and Professional Development: the Laurent Clerc National Deaf Education Center Gallaudet University, Washington, D.C. – Served as Senior Project Lead for technical assistance to meet obligations under the Education of the Deaf Act of 2008 (EDA) including the design, implementation and reporting of validity studies. Developed and reviewed technical and interpretive guides and assessment reporting to various

stakeholders; supported the development and implementation of sustainable professional development activities to implement high quality systems of standards, assessments, and accountability for deaf and hard-of-hearing students.

National Center and State Collaborative (NCSC) General Supervision Enhancement Grant – Served as Alternate Assessment Specialist and Senior Curriculum Lead working with organizational partners including SRI International, University of North Carolina, Charlotte, University of Kentucky, and the National Center for the Improvement of Educational Assessment, Inc. to support the implementation and coordination of validity evaluation including technical documentation of project activities including standard setting performance level descriptors and student report descriptors; lead and supported other workgroup projects related to development of the core content connectors in English Language Arts and mathematics, assessment, curriculum and instruction and professional development activities. Served as a liaison to coordinate communications and implementation of the project's alternate assessment system and related activities with the five partner organizations, 18 states, and the six Pacific Rim entities, and testing vendors.

Pruebas Puertorriqueñas de Evaluación Alterna (PPEA), Puerto Rico Department of Education Technical Assistance – Served as Senior Project Lead to provide technical assistance for implementation of the general and alternate assessment systems.; developed assessment training processes including assessment training modules and hands-on components for test administrators of the alternate assessment. supported development of accommodations procedures and resources for instruction and assessment; and developed protocols for the implementation of accommodations studies and reviewed technical reports.

Professional Experience

Supervisor in the Standards and Assessment Division, Wyoming Department of Education
2007 – 2011

Director of Alternate Assessment, Wyoming Department of Education
2006 – 2011

Literacy Education Consultant, Wyoming Department of Education
2005 – 2006

Literacy Consultant for certified elementary teachers in Adams 12 School District, Colorado

Spring 2004

Literacy Coordinator for Special Education teachers district-wide, Albany County School District #1
2003 – 2005

Special Education Teacher, Beitel Elementary School
1994 – 2005

Special Education Teacher, Boyton Middle School, Ithaca, New York
1983 – 1986

Special education teacher, Dewitt Middle School, Ithaca, New York
August 1982 – December 1982

Special Education teacher, Laramie Junior High School, Laramie, Wyoming
1980 – 1982

Special Education Teacher, Johnson Junior High School, Cheyenne, Wyoming
1979 – 1980

Special Education Teacher, People Places, Inc., Pygmalion School, Staunton, Virginia
1977 – 1979

Selected Professional Affiliations & Organizations

National Council on Measurement in Education (NCME)

American Educational Research Association (AERA)

Council for Exceptional Children (CEC)

Certifications

Office for Human Research Protections (OHRP) Internal Review Board (IRB) Human Research Curriculum Certification Spring 2018

Office for Human Research Protections (OHRP) Internal Review Board (IRB) Human Research Curriculum Certification Spring 2015

AdvancED Quality Assurance Review Team Training, Spring 2010

Baldrige National Quality Performance Excellence Systems Training (2009, 2010)

Organizational Assessment Training, July 2009

Visual Strategies, Keys to Improving Communication, Behavior & Social Skills, Autism Spectrum Disorders and Visual needs, September, 2008

Facilitative Leadership Training, June 2007

Reading First Program Specific Training, 2004 – 2005

DIBELS Mentor and Assessment Training, October 2004

Second Chance at Literacy Learning Certification, 2003 – 2004

Foundation for Comprehensive Early Literacy Learning; Extended Literacy Learning Coordinator, 2002 – 2003

Selected Publications & Presentations

Summers, L, Clayton, J., Herrera, B., & Turner, C. (2017, December). Supporting Access to Science and Social Studies Using Content Modules. The Association for Persons with Severe Handicaps (TASH), New Orleans, Louisiana

Deters, L., Nebelsick-Gullett, L., Turner, C., Herrera, B., & Towles, E. (2016, April). Evaluating the Degree of Coherence Between Instructional Targets and Measurement Models. National Council on Measurement in Education, Washington, D.C.

Herrera, B., Turner, C., Nebelsick-Gullett, L., & Scott, L. (2016, April). Consideration of the Learner, the Teacher, and Item Performance. National Council on Measurement in Education, Washington, D.C.

Turner, C. & Herrera, B. (2016, April). Writing Instruction: What We Know and Still Need to Know. Council for Exceptional Children, St. Louis, MO.

Herrera, A., Turner, C., Quenemoen, R., & Thurlow. M. (2015, November). NCSC's age- and grade-appropriate assessment of student learning. NCSC Brief, Number 6.

Davidson, A., Hagge, S., Herrera, B., Turner, C., Egan, K., Flowers, C., Quenemoen, R., & Thurlow, M. (2015, April). Incorporating accessibility and complexity concepts into test specification and anchor set selection for alternate assessments of alternate achievement standards. American Educational Research Association, Chicago, IL.

Flowers, C., Herrera, B., Turner, C., Towles-Reeves, L., Davidson, A., Hagge, S., Thurlow, M., & Quenemoen, R. (2015, April). Developing a large-scale assessment using

evidence-centered design: Did it work? National Council on Measurement in Education, Chicago, IL.

Hagge, S., Davidson, A., Herrera, B., Turner, C., & Thurlow, M. (2015, April). Item construct maintenance when varying levels of support and complexity. National Council on Measurement in Education, Chicago, IL.

Turner, C. (2015, April). Items in action: Implementing items in the classroom. (Symposium: Writing for students with significant cognitive disabilities: It's more than just writing their names). American Educational Research Association, Chicago, IL.

Turner, C. (2014, June). *While this may be true, the stepping stones to transition are not enough* Presentation at the annual meeting of the Council of Chief State School Officers, New Orleans, LA.

Wakeman, S., Turner, C., Herrera, B., & Lee, A. (2013, April). *Graduated understandings for instruction of students with significant disabilities: Movement toward common core state standards.* Presentation at the annual meeting of the Council for Exceptional Children, San Antonio, TX.

Turner, C. (2005 – present). Wyoming School Improvement Conferences, spring and fall presentations.

Kettler, R. J., et al. (including C. Turner), (2011). *Enhancing the Accessibility of High School Science Tests: A Multi-State Experiment on AA-MAS Validity.* In press.

Turner, C. (May, 2010). *The Role of Instruction in Alignment Related to Alternate Assessment AAAS*. American Educational Research Association Annual Meeting, SIG-Inclusion & Accommodation in Large-Scale Assessment Roundtable Session.

Turner, C. (May, 2010). *Correlates of Student Performance on an Alternate Assessment Based on Alternate Achievement Standards (AA-AAS).* American Educational Research Association Annual Meeting.

Karvonen, M., Flowers, C., Turner, C.D., & Herrera, B. (April, 2010). *Correlates of Student Performance on an Alternate Assessment Based on Alternate Achievement Standards: The Role of Learner Characteristics and the Instructional Program.* American Educational Research Association Annual Meeting, Denver, CO. Preprint, available at respository@aera.net.

James William Pellegrino
Liberal Arts & Sciences Distinguished Professor
Co-Director of Learning Sciences Research Institute
University of Illinois at Chicago
1240 West Harrison, M/C 057
Chicago, IL 60602
312-413-2320
PELLEGJW@UIC.EDU

a. Professional Preparation

Colgate University	Hamilton, NY	Psychology	B.A.	1969
University of Colorado	Boulder, CO	Exp. & Quant. Psychology	M.A.	1970
University of Colorado	Boulder, CO	Exp. & Quant. Psychology	Ph.D.	1973

b. Appointments

2001-	Liberal Arts & Sciences Distinguished Professor; Distinguished Professor of Education; Co-Director, Learning Sciences Research Institute, University of Illinois at Chicago
1992-1998	Dean, Peabody College of Education and Human Development, Vanderbilt University
1989-2001	Frank W. Mayborn Professor of Cognitive Studies, Peabody College, Vanderbilt University
1987-1989	Chairman, Department of Education, University of California at Santa Barbara
1979-1989	Associate Professor and Professor of Education and Psychology, University of California at Santa Barbara
1973-1979	Assistant and Associate Professor in the Department of Psychology and Research Associate in the Learning Research and Development Center, University of Pittsburgh

c. Products

PRODUCTS MOST CLOSELY RELATED

1. Pellegrino, J. W. (2013). Proficiency in science: Assessment challenges and opportunities. *Science, 340,* 320-323.
2. Pellegrino, J. W. (2014). A learning sciences perspective on the design and use of assessments in education. In K. Sawyer (Ed.), *Cambridge Handbook of Research in the Learning Sciences* (pp. 233-252). Cambridge, England: Cambridge University Press.
3. Pellegrino, J. W., DiBello, L., & Brophy, S. (2014). The science and design of assessment in engineering education. In A. Johri & B. Olds (Eds.). *Cambridge Handbook of Engineering Education Research* (pp. 571-598). Cambridge, England: Cambridge University Press.
4. Jorion, N. Gane, B. Schroeder, L., James, K., DiBello, L., & Pellegrino, J. W. (2015). An analytic framework for evaluating the validity of concept inventory claims. *Journal of Engineering Education, 104*(4), 454-496, 2015.
5. Harris, C., Krajcik, J., Pellegrino, J. W., & DeBarger, A. (2019). Designing knowledge-in-use assessments to promote deeper learning. *Educational Measurement: Issues and Practice, Summer 2019, 38(2),* 53-67.

OTHER SIGNIFICANT PRODUCTS

1. Pellegrino, J. W., DiBello, L., & Goldman, S. (2016). A framework for conceptualizing and evaluating the validity of instructionally relevant assessments. *Educational Psychologist, 51(1)*, 59-81.
2. Pellegrino, J. W., Wilson, M., Koenig, J., & Beatty, A. (Eds.) (2014). *Developing Assessments for the Next Generation Science Standards*. Washington, DC: National Academy Press.
3. Pellegrino, J. W., & Hilton, M. (Eds.) (2012). *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century*. Washington, DC: National Academy Press.
4. Pellegrino, J. W., Chudowsky, N., & Glaser, R. (Eds.) (2001). *Knowing What Students Know: The Science and Design of Educational Assessment*. Washington, DC: National Academy Press.
5. Donovan, S., Bransford, J., & Pellegrino (Eds.) (1999) *How People Learn: Bridging Research and Practice*. Washington, DC: National Academy Press.

d. Synergistic Activities

1. National Academy of Sciences/National Research Council *Committee on the Evaluation of the National and State Assessments of Educational Progress* (Committee Chair)
2. National Academy of Sciences/National Research Council *Committee on Cognitive Science Foundations of Assessment* (Committee Co-chair)
3. National Academy of Sciences/National Research Council *Committee on Learning Research and Educational Practice* (Committee Co-chair)
4. National Academy of Sciences/National Research Council *Committee on Strategic Education Research Partnerships: Panel on Learning and Instruction* (Committee Chair)
5. National Academy of Sciences/National Research Council *Committee on Assessment of K-12 Science Proficiency* (Committee Co-chair)

BRIAN DOUGLAS GANE

[redacted]

a. Professional Preparation

University of Texas (Austin, TX): Psychology; Bachelor of Arts, 2001
Georgia Institute of Technology (Atlanta, GA): Engineering Psychology; Master of Science, 2006
Georgia Institute of Technology (Atlanta, GA): Engineering Psychology; Doctor of Philosophy, 2011
Georgia Institute of Technology (Atlanta, GA): STEM Education; Postdoctoral Fellow, 2011-2013
University of Illinois at Chicago (Chicago, IL): STEM Assessment; Postdoctoral Research Associate, 2013-2014

b. Appointments

(2019 – Present) Research Assistant Professor, Learning Sciences Research Institute, University of Illinois at Chicago
(2014 – 2019) Visiting Research Assistant Professor, Learning Sciences Research Institute, University of Illinois at Chicago

c. Products

1. Douglas, K., A., Gane, B. D., Neumann, K., & Pellegrino, J. W., (in press). Contemporary methods of assessing integrated STEM competencies. In C. C. Johnson, M. Mohr-Schroeder, T. Moore, L. Bryan, & L. English (Eds.) *Handbook of research on STEM education*. New York, NY: Routledge/Taylor & Francis.
2. Gane, B. D., Zaidi, S. Z., & Pellegrino, J. W. (2018). Measuring what matters: Using technology to assess multidimensional learning. *European Journal of Education, 53*, 176–187. https://doi.org/10.1111/ejed.12269
3. Pellegrino, J. W., Gane, B. D., Zaidi, S. Z., Harris, C. J., McElhaney, K. W., Alozie, N., Haugabook-Pennock, P., Severance, S., Neumann, K., Fortus, D., Krajcik, J., Nordine, J., Fırtak, E. M., Briggs, D., Chattergoon, R, Penuel, B., Wingert, K. Van Horne, K. (2018). The challenge of assessing "knowledge in use": Examples from three-dimensional science learning and instruction. In Kay, J. and Luckin, R. (Eds.). *Rethinking Learning in the Digital Age: Making the Learning Sciences Count, 13th International Conference of the Learning Sciences (ICLS) 2018*, Volume 2. London, UK: International Society of the Learning Sciences.
4. DiBello, L. V., Pellegrino, J. W., Gane, B. D., & Goldman, S. R. (2017). The contribution of student response processes to validity analyses for instructionally supportive assessments. In K. Ercikan & J. W. Pellegrino (Eds.), *Validation of score meaning in the next generation of assessments*. New York, NY: Routledge.
5. Jorion, N., Gane, B. D., James, K., Schroeder, L., DiBello, L. V., & Pellegrino, J. W. (2015). An analytic framework for evaluating the validity of concept inventory claims.

Journal of Engineering Education, 104, 454–496. https://doi.org/10.1002/jee.20104

Other Significant Products

1. Jorion, N., Gane, B. D., DiBello, L. V., & Pellegrino, J. W. (2015). Developing and validating a concept inventory. In *Proceedings of the 2015 American Society for Engineering Education Annual Conference and Exposition* (electronic). American Society for Engineering Education.
2. Gane, B. D., Denick, D., Jorion, N., DiBello, L. V., Pellegrino, J. W., Streveler, R. A., & Miller, R. L. (2015). Continuous improvement of a concept inventory: Using evidence centered design to refine the Thermal and Transport concept inventory. In *Proceedings of the 2015 American Society for Engineering Education Annual Conference and Exposition* (electronic). American Society for Engineering Education.
3. Gane, B. D. & Catrambone, R. (2010). Learning to categorize word problems: Effects of practice schedule. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *Proceedings of the Ninth International Conference of the Learning Sciences - Volume 2, Short Papers, Symposia, and Selected Abstracts* (pp. 322–323). International Society of the Learning Sciences: Chicago, IL.
4. Gane, B. D. & Catrambone, R. (2007). Ordering worked examples to promote categorization. In D. S. McNamara & J. G. Trafton (Eds.), *Proceedings of the 29th Annual Conference of the Cognitive Science Society* (pp. 1019–1024). Austin, TX: Cognitive Science Society.
5. Lyons, K., Starner, T., & Gane, B. D. (2006). Experimental evaluations of the Twiddler one-handed chording mobile keyboard. *Human-Computer Interaction,* 21, 343–392. https://doi.org/10.1207/s15327051hci2104_1

d. Synergistic Activities

1. Co-developed (with faculty at University of Illinois at Chicago, Michigan State University, and SRI International) multi-dimensional assessment tasks that are aligned to the Next Generation Science Standards. These materials are made freely available for teachers online.
2. Co-lead a workshop for an international audience of science researchers (at the 2018 International Conference of the Learning Sciences) on the process for developing multi-dimensional assessment tasks.
3. Co-lead workshops for state and district science education leadership in Kentucky, Rhode Island, and Oklahoma on the process for developing multi-dimensional assessment tasks and rubrics.
4. Co-lead professional development workshops for K-12 science teachers in Illinois, including Chicago Public School district, focused on developing capacity for (a) creating and using assessments for the Next Generation Science Standards and (b) enacting multi-dimensional instruction that is aligned with the Next Generation Science Standards.
5. Co-developed (with faculty at Georgia Institute of Technology and middle school teachers in Georgia) science curriculum and teacher materials that integrate engineering design into physical science. These materials are made freely available for teachers online.

BIOGRAPHICAL SKETCH

NAME: Ko, Mon-Lin (Monica)

POSITION TITLE: Research Assistant Professor

eRA COMMONS USER NAME:

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	MM/YYYY	FIELD OF STUDY
Northwestern University	B.A.	06/2005	Biology – emphasis in Neurobiology
Northwestern University	Ph.D,	06/2013	Learning Sciences

Positions and Employment

2014- present Visiting Research Assistant Professor, Learning Sciences Research Institute, University of Illinois at Chicago
2012- 2014 Visiting Research Specialist, Learning Sciences Research Institute, University of Illinois at Chicago
2010-2013 Graduate Researcher, Northwestern University
2008-2010 Doctoral fellow, Northwestern University

Other Experience and Professional Memberships

American Educational Research Association (AERA)
National Association of Research in Science Teaching (NARST)
International Society of Learning Sciences (ISLS)

Honors

2010 Best Student Paper – honorable mention. AERA SIG-Learning Sciences and SIG-Advanced Technologies for Education.
2007 – 2008 Northwestern University Fellow
2012 International Conference of the Learning Sciences (ICLS) doctoral consortium

Contribution to Science

1. **Ko, M.-L. M.,** & Krist, C. (2019). Opening up curricula to redistribute epistemic agency: A framework for supporting science teaching. *Science Education*, *103*(4), 979–1010. https://doi.org/10.1002/sce.21511
2. Goldman, S. R., Greenleaf, C., Yukhymenko-Lescroart, M., Brown, W., **Ko, M.-L. M**., Emig, J. M., George, M., Wallace, P., Blaum, D., & Britt, M. A. (2019). Explanatory Modeling in Science Through Text-Based Investigation: Testing the Efficacy of the Project READI Intervention Approach. *American Educational Research Journal*, 0002831219831041. https://doi.org/10.3102/0002831219831041
3. Goldman, S. R., **Ko, M.**, Greenleaf, C., & Brown, W. (2018). Domain-specificity in the practices of explanation, modeling, and argument in the sciences. In *Scientific Reasoning and Argumentation* (pp. 131–151). New York, NY: Routledge.
4. Goldman, S. R., Ko, M., Greenleaf, C., & Brown, W. (2018). Domain-specificity in the practices of explanation, modeling, and argument in the sciences. In *Scientific Reasoning and Argumentation* (pp. 131–151). New York, NY: Routledge.

5. Ko, M., Goldman, S.R., Radinsky, J.R., James, K., Hall, A., Popp, J., Bolz, M., George, M. (2016) Looking under the hood: Productive messiness in design for argumentation in science, literature and history. In Svhila V. & Reeve, R. (Eds) Untold story: Design as Scholarship In the Learning Sciences. New York, NY: Routledge.
6. Wink, D. J., Gane, B. D., Ko, M-L., George, M., Zeller, L., Goldman, S., Pellegrino, J., Kang, R. (2018). Developing Interdisciplinary Competencies for Science Teaching and Learning: A Teacher - Researcher Professional Learning Community. *In Rethinking Learning in the Digital Age. Making the Learning Sciences Count, The International Conference of the Learning Sciences (ICLS) 2018*, Volume 3 Kay, J. & Luckin, R., eds, 1521-1522.

Analysis of classroom communities and their engagement with scientific practices

1. Ko, M. & Krist, C. (2018). Redistributing Epistemic Agency: How Teachers Open Up Space for Meaningful Participation in Science. In Kay, J. and Luckin, R. (Eds.). *Rethinking Learning in the Digital Age: Making the Learning Sciences Count, 13th International Conference of the Learning Sciences (ICLS) 2018.* London, UK: International Society of the Learning Sciences.
2. Ko. M. & Elby, A (2018). Talking Past One Another: Looking for signs of Conversational Mismatch in One 6th grade Science Classroom In Kay, J. and Luckin, R. (Eds.). *Rethinking Learning in the Digital Age: Making the Learning Sciences Count, 13th International Conference of the Learning Sciences (ICLS) 2018.* London, UK: International Society of the Learning Sciences.
3. Ko, M. (2014). Problematizing as Scaffold for Engaging in Scientific Argumentation. In Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.). (2014). *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS) 2014*, *Volume 1, pg. 54-61*. Boulder, CO: International Society of the Learning Sciences.
4. James, K., Goldman, S.R., Ko, M., Greenleaf, C.L., Brown, W. (2014). Multiple-Text Processing in Text-Based Scientific Inquiry. Polman, J. L., Kyza, E. A., O'Neill, D. K., Tabak, I., Penuel, W. R., Jurow, A. S., O'Connor, K., Lee, T., and D'Amico, L. (Eds.). (2014). *Learning and becoming in practice: The International Conference of the Learning Sciences (ICLS) 2014, Volume 3, pg. 1571-1572.* Boulder, CO: International Society of the Learning Sciences.

Ongoing Research Support

Grant from the James S. McDonnell Foundation Teachers as Learners Initiative – 1/1/18 – 12/31/22. *How Teachers Learn: Orchestrating Disciplinary Discourse in Science, Literature, and Mathematics Classrooms.* Role: Co-PI

Grant from Chan Zuckerberg Initiative — 1/1/19 — 6/30/20 — *Equipping Middle School Teachers with Resources to Monitor the Progress of Their Students' Science Learning* Role: Senior Investigator

Grant from National Science Foundation – 7/1/2016 – 12/31/2019. *Assessment Literacy for the Development of Teacher Understanding with the Next Generation Science Standards.* Role: Senior Investigator

Grant Betty and Gordon Moore Foundation — 9/1/17 — 5/31/19. *Designing Next Generation Assessments to Support the Teaching and Learning of Life Science* Role: Senior Investigator

Completed Research Support

Grant from Institute of Education Sciences – 1/1/10 – 12/31/15. *Reading for Understanding Across Grades 6 through 12: Evidence-Based Argumentation for Disciplinary Learning.* Role: Senior Investigator

Donald J. Wink
Department of Chemistry (m/c 111); Learning Sciences Research Institute
University of Illinois at Chicago
845 West Taylor Street
Chicago, IL 60607 dwink@uic.edu

Education

University of Chicago	S.B. 1980	Chemistry
Harvard University	Ph.D. 1985	Inorganic Chemistry

Professional Experience

New York University: Chemistry	1985-1992	Assistant Professor
University of Illinois at Chicago: Chemistry		
	1992-2000	Associate Professor
	2000-present	Professor
	2000-2005	Acting Head and Head
	2006-present	Director of Undergraduate Studies
University of Illinois at Chicago: Learning Sciences Research Institute		
	2007-2016	Director of Graduate Studies
UIC Global	2016-2019	Academic Chair
American Chemical Society/ Division of Chemical Education	2019-present	Associate Editor, *Journal of Chemical Education*

Awards (selected)

University of Illinois	2014-2016	University Scholar
American Chemical Society	2014	Fellow

Publications most directly related to work in LS and chemical education:

1. "The logic of proportional reasoning and its transfer into chemistry." Wink, D. J. and Ryan, S. A. C., in *It's Just Math: Research on Students' Understanding of Chemistry and Mathematics. ACS Symposium Series*, Towns, M. H., Bain, K., Rodriguez, J-M., Eds. **2019**. Vol. *1316*, 157-171.
2. "How do we pack the world into words?" Examining the collective of humans and non-humans in the science classroom." Wink, D. J. In *Rethinking Learning in the Digital Age. Making the Learning Sciences Count, The International Conference of the Learning Sciences (ICLS)* **2018**, Volume 3 Kay, J. & Luckin, R., eds, 1721-1722.
3. "Relating Chemistry to Healthcare and MORE: Implementation of MORE in a Survey Organic and Biochemistry Course for Prehealth Students" Schroeder, L., Bierdz, J., Wink, D. J., Daubenmire, P. L., King, M. and Clark, G. A.* *J. Chem. Educ.*, **2018**, *95*, pp 37–46.
4. "Dialysis, albumin, and competitive binding; a laboratory lesson relating three chemical concepts to healthcare." Domingo, J.; Abualia, M.; Barragan, D.; Schroeder, L.; Wink, D.; King, M.; Clark, G. A.* *J. Chem. Educ.*, **2017**, *94*, 1102-1106.
5. "Connecting Protein Structure to Intermolecular Interactions: A Computer Modeling Laboratory." M. Abualia, L., M. Garcia, P. L. Daubenmire, D. J. Wink, G.A. Clark*. *J. Chem. Educ.,* **2016,** 93(8), 1353-1363.

Other recent publications

6. "Synthesis of Spirocyclic 1-Pyrrolines from Nitrones and Arynes via a Dearomative [3,3']-Sigmatropic Rearrangement," Abdullah S. Alshreimi, Guanqun Zhang, Tyler W. Reidl,

Ricardo L. Pena, Nicholas-George Koto, Shahidul M. Islam, Donald J. Wink, and Laura L. Anderson*, *Angew. Chem. Int. Ed. Engl.*, **2020**, *ASAP*, DOI: 10.1002/anie.202004652.

7. "Oxidation of Nonactivated Anilines to Generate N-Aryl Nitrenoids," Tianning Deng, Wrickban Mazumdar, Russell L. Ford, Navendu Jana, Ragda Izar, Donald J. Wink, Tom G. Driver* *J. Amer. Chem. Soc.*, **2020**, *142* , 4456-4463. DOI: 10.1021/jacs.9b13599.
8. "C-H Insertion by Alkylidene Carbenes To Form 1,2,3-Triazines and Anionic [3 + 2] Dipolar Cycloadditions to Form Tetrazoles: Crucial Roles of Stereoelectronic and Steric Effects," Fai-Jie Chen, Youngjia Li, Man Xu, Yuanzhi Xia*, Donald J. Wink, Daesung Lee* *Org. Lett.*, **2020**, *22*, 718-723. DOI: 10.1021/acs.orglett.9b04548.
9. "Constructivist frameworks in chemistry education and the problem of the 'thumb in the eye.'" Donald J. Wink. *J. Chem. Educ.* **2014**, *91(5)*, 617-622.
10. "Student learning through journal writing in a general education chemistry course for pre-elementary education majors." Michael T. Dianovsky & Donald J. Wink. *Science Education.*, **2012**, *96*, 543-565.

Synergistic Activities

- Co-Principal Investigator. *Assessment Literacy for the Development of Teacher Understanding with the Next Generation Science Standards*, National Science Foundation EHR Core Research program, 2016-2018. This project examines how high school science teachers develop practices of classroom assessment useful to their instructional decision-making and optimizes student learning. Working as learning communities in this process enables teachers to build on each others' content and pedagogical expertise through the processes of iteratively refining their assessment designs.
- Principal Investigator. *Facilitating Undergraduate Success in STEM Through Improved Competencies,* National Science Foundation S-STEM program, 2020-2014. This project is a scholarship support program for UIC chemistry and biochemistry students.
- Co-Principal Investigator, *Re-Engaging the Disengaged: A Community Centered Approach to Improving STEM Pathways for Underrepresented Students*, NSF EHR INCLUDES initiative. This involved combined community engagement, participatory action research, and formal and informal education innovations to provide an innovative method for bringing disengaged learners and communities into STEM. I continue to act as a liaison and support person for the Pilsen Environmental Rights and Reform Organization (P.E.R.R.O.) and the Pilsen Education Task Force.

1. Past-Member and Chair of Subcommittee on Higher Education, American Chemical Society Committee on Education (SOCED). This work involves advising and setting policy and work for the ACS' Education Division. It includes co-chairing of the ACS's *General Chemistry Performance Expectations* and *New Faculty* Workshops.

- Member, Committee on Chemistry and Public Affairs (CCPA), American Chemical Society. I have chaired a writing group to revise the ACS policy statement on Science and Technology Funding in the Federal Budget.
- Director, *UIC Presidents Award Program-STEM CoLab* program. This is a pre-college program for students in the PAP program, a University of Illinois merit scholarship for disadvantaged students.

Sania Zahra Zaidi

[redacted]

a. Professional Preparation

St Xavier's College	Mumbai, India	Physics	BSc. 2007
International Institute of Information Technology (IIIT)	Hyderabad, India	Computer Science Engineering	BSc. 2010
International Institute of Information Technology (IIIT)	Hyderabad, India	Computational Natural Sciences	MSc. 2011
University of Michigan	Ann Arbor, Michigan	Educational Studies: Science Education	PhD. 2016

b. Appointments

(2018-present) Visiting Research Scientist, University of Illinois at Chicago
(2016-2018) Postdoctoral Research Associate, University of Illinois at Chicago

c. Products

PRODUCTS MOST CLOSELY RELATED

1. Gane,B.D., Zaidi, S.Z., & Pellegrino, J.W. (2018). Measuring what matters: Using technology to enable the assessment of multidimensional learning. *European Journal of Educ*ation, *53*(1), 1-12. https://doi.org/10.1111/ejed.12269

2. Zaidi, S.Z, Pennock, P., Alozie, N. (2017, March). *Instructionally supportive assessment tasks and classroom-based strategies for promoting three-Dimensional learning*. Paper presented at the 2018 Annual National Conference of the National Science Teachers Association (NSTA), Atlanta, Georgia.

3. Zaidi, S.Z., Ko, M., Gane, B.D., Madden, K., Gaur, D., Pellegrino. J.W. (2018, March). *Portraits of teachers using three-dimensional assessment tasks to inform instruction*. Paper presented at the 91st NARST Annual International Conference, Atlanta, Georgia.

4. Pellegrino, J. W., Gane, B. D., Zaidi, S. Z., Harris, C. J., McElhaney, K. W., Alozie, N., Haugabook Pennock, P., Severance, S., Neumann, K., Fortus, D., Krajcik, J., Nordine, J., Furtak, E. M., Briggs, D., Chattergoon, R, Penuel, B., Wingert, K. Van Horne, K. (2018). The challenge of assessing "knowledge in use": Examples from three-dimensional science learning and instruction. In Kay, J. and Luckin, R. (Eds.). *Rethinking Learning in the Digital Age: Making the Learning Sciences Count, Proceedings of the 13th International Conference of the Learning Sciences (ICLS) 2018, 2,* 1211-1218. London, UK: International Society of the Learning Sciences.

5. Pellegrino, J. W., Harris, C., Krajcik, J., Gane, B. D., McElhaney, K. W., Pennock, P.H., Alozie, N., & Zaidi, S. Z. (2018). Design of next generation science assessments: Measuring what matters. In Kay, J. and Luckin, R. (Eds.). *Rethinking Learning in the Digital Age: Making the Learning Sciences Count, Proceedings of the 13th International Conference of the Learning Sciences (ICLS) 2018, 2,* 1212-1213. London, UK: International Society of the Learning Sciences.

OTHER SIGNIFICANT PRODUCTS

1. McElhaney, K.W., Zaidi, S.Z., Gane, B.D., Krajcik, J., Alozie, N., Harris, C., (2018, March). *Designing NGSS-aligned assessment tasks and rubrics to support classroom-based formative assessment.* Paper presented at the 91st NARST Annual International Conference, Atlanta, Georgia.
2. Gane, B.D., McElhaney, K.W., Zaidi, S.Z., Pellegrino. J.W. (2018, March). *Analysis of student and item performance on three-Dimensional constructed response assessment tasks.* Paper presented at the 91st NARST Annual International Conference, Atlanta, Georgia.Xx
3. Zaidi, S.Z. (2017, April). *Using anonymous peer and expert reviews to support middle school students in building science knowledge.* Paper presented at the 2017 Annual Meeting of the American Educational Research Association (AERA), San Antonio, Texas.
4. Bricker, L.A., Zaidi, S.Z., & Barnard, R.A. (April, 2016). *Stem Studio: Scientists and science educators learning and collaborating together about STEM-related educational design.* Poster presented at the 2016 Annual Meeting of the American Educational Research Association (AERA), Washington D.C.

d. Synergistic Activities

1. Co-lead the development of online classroom assessment tasks for middle school science (life science and physical science) on the Next Generation Science Assessment Project
2. Co-lead a series of workshop seminars for district science teachers of Chicago Public School, IL on the process for developing multi-dimensional classroom assessment tasks and rubrics.
3. Co-lead a workshop to district science teachers in DuPage County, IL on the process for developing multi-dimensional assessment tasks and rubrics.
4. Co-developed science curricula for middle school and high school students:
    a. Songer, N.B., Dewey, T., Peters, V., Reicher, M., Kwok, A., Zaidi, S., Tupper, B., Hammond, G., Myers, P. (2014). *Climate Change and Impacts on Ecosystems: A Middle School Curricular Unit.* Ann Arbor, MI: The University of Michigan.
    b. Songer, N.B., Dewey, T., Peters, V., Reicher, M., Kwok, A., Zaidi, S., Tupper, B., Hammond, G., Myers, P. (2014). *Climate Change and Impacts on Ecosystems: A High School Curricular Unit.* Ann Arbor, MI: The University of Michigan.

The National Center
for the Improvement of
Educational Assessment, Inc.

Vita
SCOTT F. MARION
President

Scott F. Marion is the President of the non-profit The National Center for the Improvement of Educational Assessment, Inc. Previously, he served as the Vice President of the Center since 2005 and as a senior associate from 2003-2005. The mission of the Center is to help states and districts foster higher student achievement through improved practices in educational assessment and accountability.

As President, Dr. Marion consults with numerous states on such issues as optimal design of assessment and accountability systems, creating or documenting legally defensible approaches to accountability and educator evaluation, gathering validation evidence for accountability programs, and designing comprehensive assessment systems to serve both instructional and accountability purposes. In addition to his management role at the Center for Assessment, Dr. Marion assists in active leadership in the Center's efforts to develop practical professional standards through the Center's annual lecture series and as a regular contributor to professional publications and the annual conferences of AERA, NCME, and CCSSO.

Education

Ph.D. May 2004. University of Colorado, Boulder, CO. Research and evaluation methodology. Specialization--Educational Assessment. Dissertation Advisor: Lorrie Shepard. Dissertation title: Psychometric Concerns When Measuring Advanced Knowledge.

Master of Science. May 1992. University of Maine, Orono, Maine. Science and Environmental Education G.P.A. 4.0 Thesis Advisor: Theodore Coladarci. Thesis title: *Gender differences in science course-taking patterns among college undergraduates: Indicators of a hidden curriculum in science education?*

Bachelor of Science. May 1979. State University of New York, College of Environmental Science and Forestry, Syracuse, NY. September 1975-May 1979. Majored in zoology and forest biology, graduated cum laude (G.P.A. 3.1).

Professional History

Wyoming Department of Education. Cheyenne, WY.

Director of Assessment and Accountability. November 1999-January 2003. Responsible for managing the state's K-12 testing program, Wyoming Comprehensive Assessment System, overseeing the state's Uniform Reporting System, and, generally, overseeing all assessment-related activities at the Wyoming Department of Education, including assessment issues related to district accreditation and student graduation requirements. Managed two budgets in excess of three million dollars per year, supervised three staff members, several external consultants, and a testing contractor.

College of Education, University of Maine, Orono, ME.

Part-time Faculty Member. 1991-1993. Responsibilities include teaching the following graduate and undergraduate courses: EDS 520--Educational Measurement; ESC 525--Planning the Environmental Curriculum; and EDB 221--Introduction to Educational Psychology.

Center for Research and Evaluation, College of Education. University of Maine, Orono, ME.

Research Associate, September 1988-July 1993. Responsibilities included conducting curriculum and program evaluations for school systems and other agencies, managing the Center's data bases and archives, writing grants and funding proposals, writing research and technical reports, and providing research design and statistical consulting services for University faculty and graduate students.

Selected Publications

Keng, L. & Marion, S. F. (2020). Comparability of Aggregated Group Scores on the "Same Test." In Haertel, Pellegrino, & Berman (eds.). *Comparability Issues in Large-Scale Assessment*. Washington, DC: National Academy of Education.

Shepard, L. A., Diaz-Bilello, E., Penuel, W. R., & Marion, S. F. (2020). *Classroom assessment principles to support teaching and learning*. Boulder, CO: Center for Assessment, Design, Research and Evaluation, University of Colorado Boulder. https://www.colorado.edu/cadre/sites/default/files/attached-files/classroom_assessment_principles_to_support_teaching_and_learning_-_final_0.pdf

Marion, S.F. & Domaleski, C. (2019). An argument in search of evidence: A critique of "A validity argument related to the use of college admissions test scores in federal accountability." *Educational Measurement: Issues and Practice, 38, 4, 27–28.* https://DOI:10.1111/emip.12307

Marion, S.F. (2018). The opportunities and challenges of a systems approach to assessment. *Educational Measurement: Issues and Practice, 37, 1*, 45-48. https://doi.org/10.1111/emip.12193

Marion, S.F., Vander Els, J. & Leather, P. (2017). Reciprocal accountability for transformative change: New Hampshire's performance assessment of competency education (PACE). *VUE: Voices in Urban Education*, 46, 20-25. http://vue.annenberginstitute.org/issues/46/reciprocal-accountability-transformative-change-new-hampshire%E2%80%99s-performance-assessment

Marion, S.F., Lyons, S., & Pace, L. (2017). Evaluating and Continuously Improving an Innovative Assessment and Accountability System. www.innovativeassessments.org.

Graue, E., Marion, S.F., & Nelson, M. (2016, Spring). Eye on her research: Assessment in a learning culture. *Education Views, pp 6-8*. School of Education, University of Colorado, Boulder.

Rothman, R. & Marion, S.F. (2016). The next generation of state assessment and accountability. *Kappan, 97, 8, 34-37.* https://journals.sagepub.com/doi/abs/10.1177/0031721716647016

Marion, S.F. & Buckley, K. (2016). Design and implementation considerations of performance-based and authentic assessments for use in accountability systems. In Braun, H. (ed). *Meeting the Challenges to Measurement in an Era of Accountability*. New York, NY: Routledge, Taylor & Francis Group.

Chattergoon, R. & Marion, S.F. (2016). Not as easy as it sounds: Designing a balanced assessment system. *The State Education Standard, 16, 1*, 6-9. http://www.nasbe.org/wp-content/uploads/Chattergoon-Marion.pdf

Marion, S.F. (2015). The search for the Holy Grail: Content-referenced score interpretations from large-scale tests. *Measurement: Interdisciplinary Research & Perspectives, 2,* 106-110. https://doi.org/10.1080/15366367.2015.1055127

Domaleski, C., Gong, B., Hess, K., Marion, S., Curl, C., Peltzman, A. (2015). Assessment to support competency-based pathways. Washington, DC: Achieve. www.Achieve.org and www.nciea.org

Marion, S., & Leather, P. (2015). Assessment and accountability to support meaningful learning. *Education Policy Analysis Archives, 23(9)*. http://dx.doi.org/10.14507/epaa.v23.1984

Marion, S.F. (2010). Constructing a validity argument for alternate assessments based on modified achievement standards. In Perie, M. *Alternate Assessments Based on Modified Achievement Standards*. Baltimore, MD: Brooks Publishing.

Li, Y., Marion, S.F., Perie, M. & Gong, B. (2010) An approach for evaluating the technical quality of interim assessments. *Peabody Journal of Education, 85, 2*, 163-185

Perie, M., Marion, S.F., & Gong, B. (2009). Moving towards a comprehensive assessment system: A framework for considering interim assessments. *Educational Measurement: Issues and Practice, 28, 3*, 5-13. https://doi.org/10.1111/j.1745-3992.2009.00149.x

Marion, S.F. (2009). Some key considerations for test evaluators and developers. In Schafer, W. and Lissitz, R. (eds.) *Alternate assessments based on alternate achievement standards: Policy, practice, and potential* (pp. 357-360).

Marion, S. F. & Perie, M. (2009). Validity arguments for alternate assessments. In Schafer, W. and Lissitz, R. (eds.) *Alternate assessments based on alternate achievement standards: Policy, practice, and potential* (pp. 115-127). Baltimore, MD: Brooks Publishing.

Marion, S. F. & Pellegrino, J. W. (2006). A validity framework for evaluating the technical quality of alternate assessments. *Educational Measurement: Issues and Practice, 25, 4,* 47-57.

Dunn, J., Gong, B. & Marion, S. F. (2006). NCLB science assessments: A unique opportunity. *Measurement: Interdisciplinary Research and Perspectives, 4, 4*, 242-246.

Marion, S. F., White, C, Carlson, D., Erpenbach, W. J., Rabinowitz, S., Sheinker, J. (2002) Making valid and reliable decisions in the determination of adequate yearly progress: A Paper in the Series: *Implementing The State Accountability System Requirements Under The No Child Left Behind Act Of 2001*. Washington, D.C.: Council of Chief State Schools Officers.

Shepard, L. A., Smith, M. L., & Marion, S. F. (1998). On the success of failure: A rejoinder to Alexander. *Psychology in the Schools, 35,* 404-406.

Shepard, L. A., Smith, M. L., & Marion, S. F. (1996). Failed evidence on grade retention. *Psychology in the Schools, 33,* 251-261.

Borko, H. Mayfield, V. Marion, S. F., Flexer, R., & Cumbo, K. (1997) Teachers' developing ideas and practices about mathematics performance assessment: Successes, stumbling blocks, and implications for professional development. *Teacher and Teacher Education, 13,* 259-278.

Eisenhart, M., Finkel, E., & Marion, S. F. (1996). Creating the conditions for scientific literacy: A re-examination. *American Educational Research Journal, 33,* 261-296.

Shepard, L. A. Flexer, R. J., Hiebert, E. H., Marion, S. F., Mayfield, V., & Weston, T. J. (1996). Effects of introducing classroom performance assessments on student learning. *Educational Measurement: Issues and Practice, 15, 3,* 7-18..

Shepard, L. A., Smith, M. L., & Marion, S. F. (1996). Failed evidence on grade retention. *Psychology in the Schools, 33, 3.*

National Research Council/National Academy of Science Publications

(Participated as an active committee member and report contributor to the following NRC reports.)

National Research Council. (2014). *Developing Assessments for the Next Generation Science Standards.* Committee on Developing Assessments of Science Proficiency in K-12. Board on Testing and Assessment and Board on Science Education, James W. Pellegrino, Mark R. Wilson, Judith A. Koenig, and Alexandra S. Beatty, *Editors.* Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Braun, H., Chudowsky, N., & Koenig, J. A. (2010). *Getting value out of value-added: Report of a workshop.* Washington, DC: National Academies Press.

National Research Council. (2010). *State assessment systems: Exploring best practices and innovations: Summary of two workshops.* Alexandra Beatty, Rapporteur; Committee on Best Practices for State Assessment Systems. National Research Council. Board on Testing and Assessment. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Technical Reports, Studies, Conference Papers and Presentations

Numerous technical reports of evaluation studies produced for such organizations as the National Science Foundation and various state agencies. I have given hundreds of presentations at various national conferences including almost yearly presentations at the American Educational Research Association (AERA)/National Council of Measurement in Education (NCME) annual meetings since 1990 and CCSSO's Large Scale Assessment Conference since 1998.

Honors, Awards, Scholarships and Fellowships

The Spencer Foundation. Spencer Dissertation Fellowship for Research Related to Education. 1998-1999.

The Spencer Foundation & American Educational Research Association. Travel Fellowship Award. 1996-1997.

American Educational Research Association & National Science Foundation. Evaluation Internship Award. 1994-1995.

American Educational Research Association, National Science Foundation, & National Center for Educational Statistics. Selected to participate in the AERA Statistics Institute. April 8-10, 1994.

University of Colorado. University Fellowship awarded by the Graduate School to fund the first year of Ph.D. studies. 1993-1994.

New York State Regents Scholarship. 1975-1979.

National Honor Society. 1974-1975.

Service

Rye School Board, Rye, NH. 2013-present; Board Chair, 2015-2017.

AERA, Division D, Robert L. Linn Distinguished Lecture Award. Committee Member: 2009-2012; 2016-present

Committee Member: AERA Book Award. 2006-2009

United States Department of Education. National Technical Advisory Committee Member. 2008-2010

The National Center
for the Improvement of
Educational Assessment, Inc.

Vita
NATHAN DADEY
Associate

Nathan Dadey is interested in the design, scaling, and use of educational assessments, particularly assessments used for accountability purposes. He aims to produce methodological and applied work that contributes to improved understanding and use of assessment results in policy contexts.

In terms of methodological work, Nathan focuses on tackling issues in which typical educational measurement approaches fall short. One such area is the measurement of the Next Generation Science Standards (NGSS). For example, Nathan has supported multiple state departments of education (Delaware, Wisconsin, and Nebraska) in developing conceptualizations of their NGSS statewide systems of assessments, leading content specialists in the creation of three dimensional tasks, assisting multiple SCASS groups within the Council of Chief State School Officers and reviewing NGSS performance task quality and evaluation tools (with Achieve). A second area deals with the numerous challenges inherent in designing and implementing comprehensive systems of assessment. While working to tackling these kinds of challenges, Nathan has explored ways in which a set of "mini-interim" assessments can be scaled (with Curriculum Associates), written a policy brief addressing ESSA's interim assessment provision and explored ways in which Bayesian networks can be used to summarize interim and summative assessment results.

In terms of applied work, Nathan focuses on issues that threaten the validity of assessment and accountability operational programs. These issues include the dimensionality of alternate assessment based on alternate achievement standards (on behalf of NCSC), the impact of interruptions on online assessment results (on behalf of the Smarter Balanced Assessment Consortia) as well as recommendations to address such impacts (on behalf of CCSSO), the representation of English Language Proficiency within state accountability systems (on behalf of the Latino Policy Forum), and the comparability of assessment scores across multiple digital devices (on behalf of the TILSA SCASS).

Nathan received a Ph.D. from the University of Colorado Boulder with a concentration in research and evaluation methodology.

Education

2015 **Ph.D.**, *Research and Evaluation Methodology*, University of Colorado Boulder, School of Education.

Dissertation: Getting More out of the National Assessment of Educational Progress: Investigating Dimensionality at the State-Level

Committee: Derek C. Briggs (Chair), Greg Camilli, Andrew Maul, Michael Stallings, and Lorrie Shepard

2008 **B.S.**, *Psychology (Quantitative Skills Specialization),* The Pennsylvania State University.

Publications

Peer Reviewed

2018 **Dadey, N**., Lyons, S., & DePascale, C. (2018). The comparability of scores from different digital devices: A literature review and synthesis with recommendations for practice. *Applied Measurement in Education*, 31(1), 30-50. https://doi.org/10.1080/08957347.2017.1391262

2017 Briggs, D. C., & **Dadey, N.** (2017). Principal holistic judgments and high-stakes evaluations of teachers. *Educational Assessment, Evaluation and Accountability*, 29(2), 155-178. https://doi.org/10.1007/s11092-016-9256-7

Maul, A., Penuel, W. R., **Dadey, N.**, Gallagher, L. P., Podkul, T., & Price, E. (2017). Measuring experiences of interest-related pursuits in connected learning. *Educational Technology Research and Development*, 61(1), 1-29. https://doi.org/10.1007/s11423-016-9453-6

2015 Briggs, D. C., & **Dadey, N.** (2015). Making sense of common test items that do not get easier over time: Implications for vertical scale designs. *Educational Assessment*, 20(1), 1-22. https://doi.org/10.1080/10627197.2014.995165

2012 **Dadey, N.** & Briggs, D. C. (2012). A meta-analysis of growth trends from vertically scaled assessments. *Practical Assessment, Research & Evaluation*, 17(14). Available online: http://pareonline.net/getvn.asp?v=17&n=14

Selected Working Papers

Xu, J. & **Dadey, N.** (Under Review). Using Bayesian Networks to Characterize Student Performance across Multiple Assessments of Individual Standards.

Dadey, N. & Gong, B. (In Preparation). Exploring the use of Bayesian Networks for Prediction in a System of Assessments.

Reports

2018 Marion, S., Thompson, J., Evans, C., Martineau, J., & **Dadey, N.** (2018, September) *A Tricky Balance: The Challenges and Opportunities of Balanced Systems of Assessment*. Dover, NH: National Center for the Improvement of Educational Assessment. Available online: https://www.nciea.org/sites/default/files/inline-files/A%20Tricky%20Balance_092418.pdf

Martineau, J., **Dadey, N.**, & Marion, S. (2018). *Literature Review on Developing and/or Revising Assessment Frameworks to Support a Transition from Paper-Based to Digitally-Based Assessment*. Washington, DC: National Assessment Governing Board, U. S. Department of Education.

Dadey, N., & Martineau, J. A. (2018). *Investigating Comparability in Response to Georgia Senate Bill 211*. Dover, NH: Center for Assessment.

2017 **Dadey, N.** & Gong, B. (2017, April). *Using interim assessments in place of summative assessments? Consideration of an ESSA option.* Washington, DC: Council of Chief State School Officers (CCSSO). Available online: https://ccsso.org/resource-library/using-interim-assessments-place-summative-assessments-consideration-essa-option

Lyons, S. & **Dadey, N.** (2017, March). *Considering English Language Proficiency within Systems of Educational Accountability under the Every Student Succeeds Act*. Dover, NH: The National Center for the Improvement of Educational Assessment, Inc., & The Latino Policy Forum. Available online: https://www.latinopolicyforum.org/publications/reports/document/Considerations-for-ELP-indicator-in-ESSA_030817.pdf

2016 **Dadey, N**. (2016, December). *Exploring dimensionality within the 2015 NCSC operational*

administration data. Dover, NH: The National Center for the Improvement of Educational Assessment, Inc. Available online: http://www.ncscpartners.org/Media/Default/PDFs/Resources/DimensionalityStudy.pdf

Martineau, J., & **Dadey, N**. (2016, September). *Final report on online interruptions of the spring 2015 Smarter Balanced assessment administration in Montana, Nevada, and North Dakota*. Available online: https://portal.smarterbalanced.org/library/en/online-interruptions-of-the-spring-2015-smarter-balanced-assessment-administration-in-montana-nevada-and-north-dakota.pdf Media Coverage: Education Week Market Brief (9/2/16), Billings Gazette (9/6/16)

DePascale, D., **Dadey, N**. & Lyons, S. (2016, June). *Score comparability across computerized assessment delivery devices*. Washington, DC: Council of Chief State School Officers (CCSSO). Available online: https://www nciea.org/sites/default/files/pubs-tmp/CCSSO%20TILSA%20Score%20Comparability%20Across%20Devices.pdf Media Coverage: Education Week (6/10/16), Ed Tech Magazine (8/8/16)

2015 Martineau, J., Domaleski, C., Egan, K., Patelis, T., & **Dadey, N**. (2015, November). *Recommendations for addressing the impact of test administration interruptions and irregularities*. Washington, DC: Council of Chief State School Officers (CCSSO). Available online: https://www nciea.org/sites/default/files/publications/Computer-Based-Interruptions_110415.pdf

Penuel, W. R., **Dadey, N.**, Van Horne, K., & Michalchik, V. S. (2015, July). *Surveys of connected learning, technical report, v1.0*. Available online: http://researchtools.dmlhub net/wp-content/uploads/2015/07/SurveysofConnectedLearning_TechnicalReport.pdf

2014 Briggs, D. C., Kizil, R. C. & **Dadey, N.** (2014, November). *Adjusting mean growth percentiles for classroom composition*. Boulder, CO: University of Colorado, Center for Assessment, Design, Research and Evaluation (CADRE). Available online: http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/GSGM-Technical-Evaluation.aspx

Briggs, D. C., **Dadey, N.**, & Kizil, R. C. (2014, October). *Comparing student growth and teacher observation to principal judgments in the evaluation of teacher effectiveness*. Boulder, CO: University of Colorado, Center for Assessment, Design, Research and Evaluation (CADRE). Available online: http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/GSGM-Technical-Evaluation.aspx

2013 Fuller, E. J., & **Dadey, N.** (2013, April). *Review of "*Evaluation of Teach for America in Texas Schools.*"* Boulder, CO: National Education Policy Center. Available online: http://nepc.colorado.edu/thinktank/review-evaluation-tfa-texas

2012 Briggs, D. C., **Dadey, N.**, & Weeks, J. P. (2012, January). *Evaluating growth interpretations from the DCAS vertical scales in math and reading: A validation study*. A report commissioned by the Delaware Department of Education.

Service

Reviewer

- Educational Measurement: Issues and Practice (2012-Present)
- Education Policy Analysis Archives (2015-Present)
- Annual Meeting of the American Educational Research Association (2015-2017)
- Annual Meeting of the National Council on Measurement in Education (2017, 2019)

2017 **Conference Co-Organizer,** *Reidy Interactive Lecture Series, Assessing Student Learning of the Next Generation Science Standards.*

2016 **Peer Reviewer,** *U.S. Department of Education Peer Review of State Assessment Systems, June Review*.

2014 **Faculty Search Committee, Graduate Student Representative,** *University of Colorado Boulder, School of Education.*

2011-2012 **Student Reviewer**, *American Educational Research Journal – Social and Institutional Analysis (AERJ-SIA) Student Editorial Committee (with Kenneth R. Howe)*.

2009-2010 **Coordinator**, *International Objective Measurement Workshop Conference (with Derek C. Briggs)*.

2009 **Coordinator**, *University of Colorado Boulder, School of Education Ph.D. Orientation*.

Professional Memberships

American Educational Research Association
American Evaluation Association
American Psychological Association
National Council on Measurement in Education

Software

Proficient in:	BILOG-MG, flexMIRT, HLM, IRTPRO, Mathematica, SPSS, R/S-PLUS
Familiar with:	BIMRT, ConQuest, GENOVA, Minitab, Microsoft Access, SAS, SQL, Winsteps

HOWARD EVERSON
SRI International

Senior Principal Education Researcher
Center for Education Research & Innovation, Education Division

Specialized Professional Competence

Research on the design and development of technology-enhanced assessments—both formative and summative—including test design and advanced psychometric modeling, as well conducting investigations into the relationship among cognition, instruction and assessment.

Representative Research Assignments

Executive Director of a subcontract to the American Institutes for Research to support the statistical and psychometric analyses of the National Assessment of Educational Progress (NAEP). This subcontract called for providing ongoing statistical review of findings from the NAEP assessments in Mathematics, Science and English language arts.

Chief Research Scientist, the College Board. This role provided technical oversight and direction to researchers working in support of the SAT, PSAT and AP Programs. This work included offering guidance on issues of research design, sampling, and psychometric modeling. Over the course of more than a decade the College Board and ETS annual research budgets increased to more than $10 million.

Principal Investigator of the New York State Education Department (NYSED)-funded study of the implementation of the Common Core Learning Standards across school districts in New York state, and New York City. This research involved identifying and selecting schools and school districts for in-depth study, and the design and implementation of quantitative and qualitative case studies in eight targeted school districts.

Principal Investigator of a PARCC-funded pilot study to investigate the measurement properties of a collection of technology-enhanced mathematics items aligned to the Common Core Math standards. This pilot study, done in collaboration with the Uri Treisman at the University of Texas, Austin, was conducted in two large school districts and the psychometric results were used to inform and improve the design of computer-based math assessment items for PARCC.

Co-Principal Investigator for SRI of a federally funded study, *Strengthening Claims-Based Interpretations and Uses of Local and Large-Scale Science Assessment Scores (SCILLSS)*, conducted in collaboration with the Nebraska Department of Education and edCount LLC. This project brought together a collaborative of three states—Nebraska, Montana, and Wyoming—to develop a comprehensive approach to design and develop classroom-based and large-scale science assessment tasks aligned to the Next Generation Science Standards (NGSS).

Professional Experience

Director, Assessment Research, Design & Development, Center for Technology in Learning, SRI International (2016-present)

Co-Chair, along with Marianne Perie, of the New York State Education Department Technical Advisory Committee (1995-Present)

Co-Chair, along with James Pellegrino, of the Technical Advisory Panel, (2009-Present)

Member of the Department of Defense Language Testing Advisory Panel (2005-Present)

Editor, *Educational Measurement: Issues & Practice* (sponsored by the National Council on Measurement in Education—2016-2018).

Elected Fellow: American Psychological Association, the American Educational Research Association.

Elected Member of the Board of Directors, National Council of Measurement in Education.

Director, Center for Advanced Study in Education, Graduate School & University Center, City University of New York (2012-2015)

Professor, Educational Psychology & Psychometrics, Graduate Center, City University of New York (Adjunct, 2009-present)

Executive Director, American Institutes for Research, NAEP Educational Statistical Services Institute, Washington, DC (2005-2006)

Vice President & Chief Research Scientist, College Board, New York, NY (1992-2005).

Psychometric Research Fellow, Educational Testing Service, Princeton, NJ (1991-1992)

Director of Assessment Research, City University of New York (1985-1991)

Academic Background

Ph.D., educational psychology, 1985, Graduate School, City University of New York
M.A., teacher education, 1975, Montclair State College, New Jersey
B.A., psychology, 1972, Brooklyn College, City University of New York,

Selected Publications

Bennett, A., Bridglall, B.L., Cauce, A.M., Everson, H.T., Gordon, E.W., Lee, C.D., Mendoza-Denton, R., Renzulli, J.S. & Stewart, J.K. (2004). *All Students Reaching The Top: Strategies For Closing Academic Achievement Gaps*. Learning Points Associates, Naperville, IL.

Borhnstedt, G., Rodriguez, C. & Everson, H.T. (2003). *Closing the Achievement Gap: Summary Evaluation of the College Board's Equity 2000 Initiative.* Washington, DC: American Institutes for Research.

Dixon-Roman, E., Everson, H.T., & McArdle, J.J. (2012). Race, Poverty and SAT Scores: Modeling the Influences of Family Income on Black and White High School Students' SAT Performance. *Teachers College Record* Volume 115 Number 4, 2013 http://www.tcrecord.org ID Number: 16925.

Everson, H.T. (2006). *The Problem of transfer and adaptability: Applying the learning sciences to the challenge of the achievement gap*. In E.W. Gordon & B. Bridglall (Eds.) *The Affirmative Development of Academic Achievement,* Rowman & Littlefield, Minneapolis, MN.

Everson, H.T. (2010). Cross-cultural issues and approaches in educational assessment. In K. Keith (Ed.). *Cross-Cultural Psychology: A Contemporary Reader*. Hoboken, NJ: Wiley-Blackwell.

Everson, H.T. (2010). *Sketches of San Juan: A Summary of Six Special Studies on the National Assessment of Educational Progress Mathematics in Puerto Rico*. Technical Report to the National Center for Education Statistics. NAEP Education Statistics Services, American Institutes for Research, Washington, DC.

Everson, H.T. (2016). *Identifying Best Practices for Implementing the Common Core Learning Standards: A Cross-District Evaluation Report* (The Center for Advanced Study in Education, Graduate Center of the City University of New York.

Everson, H.T., Cook, L. & Zelman, M. (2014). *A Validity Audit of the Unified National Test*, Ministry of Education and Sciences, Republic of Kazakhstan, and the World Bank, Washington, DC.

Everson, H.T., Freedman, S., McLean, C., Saxman, L. & Stevens, A. (2014). *Summary Evaluation Report: MSPinNYC2. The* Center for Advanced Study in Education, Graduate School, City University of New York.

Everson, H.T., Pellegrino, J.W., & Perie, M. (2014). *Summary of the Phase I Standard Setting for the Excellence for All Initiative of the National Center on Education and the Economy*, Washington, DC.

Everson, H.T., Verkuilen, J., Stevens-Thomas, A., Racanello, A. (2013). *The PARCC Mathematics Item Prototyping Project: Report of the Spring 2012 Pilot Study*. Center for Advanced Study in Education, Graduate School, City University of New York.

Millsap, R.E. & Everson, H. (1993). Methodology review: Statistical methods for detecting test bias. *Applied Psychological Measurement*, 17(4).

M. Rabinowitz, F. Blumberg, & H. Everson (Eds.) (2004). *The design of instruction and evaluation: Affordances of using media and technology.* Mahwah, NJ: Erlbaum Associates.

Snow, E., Rutstein, D., Basu, S. & Everson, H.T. (2019). Leveraging evidence-centered design to develop assessments of computational thinking processes. *International Journal of Testing*, 19(2).

Sternberg, R.J., & Rainbow Project Collaborators (2005). Augmenting the SAT through assessments of analytical, practical and creative skills. In W. Camara and E. Kimmel (Eds.) *Choosing students: Higher education admission tools for the 21st century* (pp. 159-176). Mahwah, NJ: Erlbaum Associates.

Tobias, S. & Everson, H. (2000). Cognition and metacognition: A Review of Metacognition in Educational Theory and Practice. In D. Hacker, J. Dunlosky & A. C. Graesser (Eds.) *Issues in Education: Contributions from Educational Psychology*, Vol. 6, No. 1-2, 167-173.

Thomas, A.S., Bonner, S.M., Everson, H.T., & Somers, J.A. (2016). Leveraging the power of peer-led learning: Investigating effects on STEM performance in urban high schools. *Educational Research and Evaluation*, http://dx.doi.org/10.1080/13803611.2016.1158657.

Snow, E., Rutstein, D., Basu, S. & Everson, H.T. (2019). Leveraging evidence-centered design to develop assessments of computational thinking processes. *International Journal of Testing*, 19(2).

DAISY RUTSTEIN
SRI International

Principal Education Researcher
Center for Education, Research & Innovation, SRI Education

Specialized Professional Competence

Application of evidence-centered assessment design (ECD) for innovative and technology-supported classroom and state assessments; research in modeling complex assessments.

Representative Research Assignments at SRI International

Principal investigator, for the development of a game-based assessment to provide formative information for teachers in students for middle school computer science.

Principal investigator, lead for the development of assessments around ELA, mathematics, science and social studies for pre-K through second grade. This project involves the application of ECD to the development of several different assessments across different age ranges and covering different topic areas.

Co-principal investigator, lead of the assessment development of Next Generation Science Standards (NGSS)-aligned, 3-dimensional assessments for science at the middle school and elementary school levels.

Senior educational researcher, assessment lead for the application of ECD to design, develop and validate assessments of computational thinking for a high school computer science curriculum. This project includes the creation of design patterns and assessments for computational thinking practices, including (but not limited to) communication and collaboration.

Senior educational researcher, assessment lead for the application of ECD to design, develop and validate assessments of computational thinking for an elementary school computer science curriculum. This project includes the creation of design patterns and assessments for computational thinking practices, including (but not limited to) communication and collaboration.

Senior educational researcher, lead for the development of assessments around science content and practices for preschool children. This project involves the application of ECD to the development of assessment for three curricular modules for science.

Educational researcher, assessment lead for the development of Common Core aligned writing assessments to be administered to late elementary and middle school students. This development included the development of prompts, stimulus material and rubrics.

Educational researcher, assessment lead for the development of assessments to measure teachers thinking of student's fractional knowledge, as well as the lead for the development of an assessment of elementary student's fractional knowledge.

Educational researcher, assessment lead for the development of assessments to measure middle school students ability to engage in mathematical argumentation.

Education researcher, Application of Evidence-Centered Design to Large Scale Science Assessment. This project involves the creation of design documents to support the application of ECD to the development of science interactive computer tasks (ICT) items for the National Assessment of Educational Progress (NAEP).

Professional Experience

SRI International (2011–present)
Statistical consultant, Uniformed Services University of Health Sciences (2007–2010)
Graduate research assistant, Cisco Systems, University of Maryland (2004–2010)
Developer support engineer, RSA Security (2000–2004)
Teaching assistant, University of California, Santa Cruz (1998–2000)

Education

Ph.D., measurement, statistics and evaluation, 2012, University of Maryland
M.A., mathematics, 2000, University of California, Santa Cruz
B.A., mathematics and computer science, 1998, University of California, Santa Cruz

Selected Publications and Presentations

Bienkowski, M., Snow, E., Rutstein, D. W., & Grover, S. (2015). *Assessment design patterns for computational thinking practices in secondary computer science: A first look* (SRI technical report). Menlo Park, CA: SRI International. Retrieved from http://pact.sri.com/resources.html

Grover, S., Rutstein, D., & Snow, E. (2016). "What is a computer": What do secondary school students think? In *Proceedings of the 47th ACM Technical Symposium on Computing Science Education* (pp. 564–569). New York: NY: ACM Press. http://doi.org/10.1145/2839509.2844579

Haertel, G., Vendlinski, T., Rutstein, D. W., Cheng, B., & DeBarger, A. (2013). *Designing scenario-based, technology-enhanced assessment tasks using evidence-centered design.* Paper presented at the annual meeting of the National Council on Measurement in Education, San Francisco, CA.

Haertel, G., Vendlinski, T., Rutstein, D. W., Debarger, A., Cheng, B., Snow, E., D'Angelo, C., Harris, C., Yarnall, L., & Ructtinger, L. (2016). General introduction to evidence-centered design. In H. Braun (Ed.), *Meeting the challenges to measurement in an era of accountability.* New York, NY: Routledge.

Haertel, G., Vendlinski, T., Rutstein, D. W., Debarger, A, Cheng. B., Ziker, C., Harris, C., D'Angelo, Snow, E., Bienkowski, M., & Ructtinger, L. (2016). Assessing the life sciences: Using an evidence-centered design for accountability purposes. In H. Braun (Ed.), *Meeting the challenges to measurement in an era of accountability.* New York, NY: Routledge.

Knudsen, J., Lara-Meloy, T., Stevens, H. S., Rutstein, D. W. (2014). Advice for mathematical argumentation. *Mathematics teaching in the middle school, 19*(8).

Mislevy, R. J., Behrens, J. T., Bennett, R. E., Demark, S. F., Frezzo, D. C., Levy, R., Robinson, D. H., Rutstein, D. W., Shute, V. J., Stanley, K., & Winters, F. I. (2010). On the roles of external knowledge representations in assessment design. *Journal of Technology, Learning, and Assessment, 8*(2). http://escholarship.bc.edu/jtla/vol8/2

Mislevy, R. J., Riconscente, M. M., & Rutstein, D. W. (2009). *Design patterns for assessing model-based reasoning* (PADI-Large Systems Technical Report 6). Menlo Park, CA: SRI International.

Mislevy, R. J., Riconscente, M. M., Rutstein, D. W., & Ziker, C. (2017). *Assessing model-based reasoning using evidence-centered design. A suite of research-based design patterns*. Cham, Switzerland: Springer Briefs in statistics.

Mann, H., Rutstein, D. W., & Hancock, G. (2007). The potential for differential findings among invariance testing strategies for multisample measured variable path models. Educational & *Psychological Measurement, 69*(4), 603–612.

Selected Publications and Presentations (continued)

Rutstein, D. W. (2011, November). *Evidence-centered design orientation workshop.* Workshop presentation at Pearson, Inc. Iowa, City, IA.

Rutstein, D. W., Choi, Y., & Chapple, K. (2011). *Using Bayesian networks to model complex assessments.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Rutstein, D. W., & Haertel. G. (2014). *Technical issues in performance scoring.* Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Rutstein, D. W., Haertel. G., & Vendlinski, T. (2014). *Leveraging multiple perspectives to develop technology-enhanced, scenario-based assessments.* Paper presented at the annual meeting of the National Council on Measurement in Education, Philadelphia, PA.

Rutstein, D. W**.** & Mislevy, R. J. (2011) *Measuring learning progressions using Bayesian modeling in complex assessments.* Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Rutstein, D. W., Niekrasz, J., & Snow, E. (2016). *Automated scoring of constructed response items measuring computational thinking.* Paper presented at the annual meeting of the National Council on Measurement in Education, Washington, D.C.

Rutstein, D. W., Snow, E., & Bienkowski, M. (2014). *Computational thinking practices: Analyzing and modeling a critical domain in computer science education.* Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Snow, E. B., Bienkowski, M., & Rutstein, D. W. (2015, October 28). Aligning assessment purpose and use in measuring students' computational thinking practices. [AEA365 Blog post]. Retrieved from http://aea365.org/blog/stem-tig-week-daisy-rutstein-eric-snow-and-marie-bienkowski-on-aligning-assessment-purpose-and-use-in-measuring-students-computational-thinking-practices/

Snow, E., Rutstein, D., Basu, S., Bienkowski, M., & Everson, H. T. (2019). Leveraging evidence-centered design to develop assessments of computational thinking practices. *International Journal of Testing 19*(2).

Snow, E., Rutstein, D., Bienkowski, M., & Xu, Y. (2019). *Principled assessment of student learning in high school computer science* (pp. 209–216). ACM Press. https://doi.org/10.1145/3105726.3106186

West, P., Rutstein, D. W., Mislevy, R. J., Liu, J., Levy. R., DiCerbo, K. E., Crawford, A., Choi, Y., & Behrens, J. T. (2009). A Bayesian network approach to modeling learning progressions and task performances. In A. C. Alonzo, & A. W. Gotwals (Eds.), *Learning progression in science current challenges and future directions* (pg. 257–292). The Netherlands: SensePublishers.

Rutstein, D. W., Choi, Y., & Liu., J. (2009). *Modeling approaches to complex assessments.* Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA, April 2009

DANIEL LEWIS, PH.D.
2801 1st Avenue, #407, Seattle, WA 98121
831-601-8555 Dan.Lewis@CreativeMeasurement.com
www.CreativeMeasurement.com

ACADEMIC BACKGROUND

Ph.D.	Evaluation and Measurement	Kent State University, Kent, OH	1995
M.A.	Pure Mathematics	Kent State University, Kent, OH	1987
B.S.	Elementary Education	Kent State University, Kent, OH	1980

PROFESSIONAL EXPERIENCE

Founder & Chief Scientist	Creative Measurement Solutions LLC	Seattle, WA	July 2019-Present
Principal Research Scientist	ACT & Pacific Metrics	Carmel, CA	2015-2019
Chief Research Advisor	CTB/McGraw-Hill	Monterey, CA	1995-2015

- Co-developed the Bookmark Standard Setting Procedure and Embedded Standard Setting
- Facilitated standard settings for Smarter Balanced, ELPA21, and numerous state summative tests
- Supported state Department of Education staff in aligning assessment design with state policy
- Led the design and development of successful new shelf products including Acuity (interim assessment) and TASC (high school equivalency exam)

REFEREED PUBLICATIONS AND BOOK CHAPTERS

Lewis, D. & Cook, R. (2020). Embedded Standard Setting: Aligning standard setting methodology with contemporary assessment design principles. Educational Measurement: Issues and Practices, 39(1), 8-21.

Lewis, D. & Lord-Bessen, J. (2018). Standard setting. Chapter in W. J. van der Linden (Ed.), Handbook of item response theory: Vol. 3. Applications. Boca Raton, FL: Chapman & Hall/CRC.

Lewis, D. (2018). Bookmark Method of Standard Setting. Entry in the SAGE Encyclopedia of Educational Research, Measurement, and Evaluation. Sage Publications, Inc.

Lewis, D. M., Mitzel, H. C., Mercado, R. & Schulz, M. (2012). The Bookmark Standard Setting Procedure. Chapter in *Setting Performance Standards: Concepts, Methods, and Perspectives*, *Second Edition*. (ed: G. J. Cizek), Lawrence Erlbaum.

Ferrara, S. & Lewis, D. M. (2012). The Item Descriptor Matching Standard Setting Procedure. Chapter in *Setting Performance Standards: Concepts, Methods, and Perspectives, Second Edition*. (ed: G. J. Cizek), Lawrence Erlbaum.

Ho, A., Lewis, D. M., & MacGregor Farris, J. L. (2009). The dependence of growth model results on proficiency cut scores. *Educational Measurement Issues and Practices* 28(4), 15-26.

Lee, G. & Lewis, D. M. (2008). A generalizability theory approach to standard error estimates for Bookmark standard settings. *Educational and Psychological Measurement*, August 2008, 68(4), 603-620.

Lewis, D. M. & Haug, C. (2005). Aligning policy and methodology to achieve consistent across-grade performance standards. *Applied Measurement in Education*, 18(1), 11-34.

Green, D. R., Trimble, S., & Lewis, D. M. (2003). Interpreting the results of three different standards setting procedures. *Educational Measurement: Issues and Practices*, 22(1), 22-32.

Hartung, P. J., Lewis, D. M., May, K., & Niles, S. G. (2002). Family interaction patterns and college student career development. *Journal of Career Assessment*. 10(1), 78-90.

Mitzel, H. C., Lewis, D. M., Patz, R. J., & Green, D. R. (2000). The Bookmark Procedure: Cognitive perspectives on standard setting. Chapter in *Setting Performance Standards: Concepts, Methods, and Perspectives*, (ed: G. J. Cizek), Lawrence Erlbaum.

Niles, S. G., Lewis, D. M., & Hartung, P. J. (1997). Using the Adult Career Concerns Inventory to measure task involvement. *The Career Development Quarterly*, 46(1), 87-97.

Lewis, D. M., Savickas, M. L., & Jones, B. J. (1996). Career development predicts medical school success. *The Journal of Vocational Behavior*, 49(1), 86-98.

Lewis, D. M. & Cuevas, N. M. (1996). Validity and reliability issues in published public health and social policy research. Co-published simultaneously in *Journal of Health & Social Policy*, v8, 23-38, and as a chapter in *Selected Practical Problems in Health and Social Research*, 23-38, (ed: T. E. Dinero), The Hayworth Press, Inc.

Hartung, P. J., Speight, J. D., & Lewis, D. M. (1996). Individualism-collectivism and the career behavior of majority college students. *The Career Development Quarterly*, 45, 87-96.

Lewis, D. M. & Savickas, M. L. (1995). Validity of the Career Factors Inventory. *The Journal of Career Assessment*, 3(1), 44-56.

PROFESSIONAL DEVELOPMENT TRAINING WORKSHOPS

Lewis, D. & Bruce, W. (2019 April). Federal Education Policy as a Driver of Assessment Design and Practice (1960 to present). Professional development training workshop developed for and facilitated at the Annual Meeting of the American Educational Research Association.

Lewis, D. & Bruce, W. (2018, April). Federal Education Policy as a Driver of Assessment Design and Practice (1960 to present). Professional development training workshop developed for and facilitated at the Annual Meeting of the National Council on Measurement in Education.

INVITED PRESENTATIONS

Lewis, D. & Forte, E. (2019, October). Embedded Alignment & Standard Setting. Invited presentation to the CCSSO fall meeting of the Technical Issues in Large Scale Assessment (TILSA) SCASS, Baltimore.

Lewis, D. (2019, April). A Principled Approach to Score Reporting in Support of Users' Needs and Values. In Nichols, P. (org), The Influence of Stakeholder Needs and Values on Assessment Design and Reporting. Invited presentation at the Annual Meeting of the National Council on Measurement in Education.

Lewis, D. (2019, February). A Principled Approach to Score Reporting, Invited presentation to the CCSSO winter meeting of the Technical Issues in Large Scale Assessment (TILSA) SCASS, Baltimore.

Lewis, D. (2016, November). Innovations and Current Issues in Educational Assessment. Invited presentation at the McGraw-Hill Education Assessment Symposium, Miami.

Lewis, D. (2014, April). Development and validation of a technology-enhanced score report. Invited address at the annual meeting of the Directors of Research and Evaluation, Philadelphia.

Lewis, D. M. (2012, April). The use of student growth in the evaluation of teacher effectiveness. Invited address at the annual meeting of the Directors of Research and Evaluation, Vancouver, B.C.

Lewis, D. M. (2012, July). Measuring student growth to support the evaluation of educator effectiveness. Keynote address at the Dalian Education Evaluation Seminar, Dalian Modern Learning Science Research Institute, Dalian, China.

Lewis, D. M. (1998, November). The connection of assessment to standards. Keynote address at the West Virginia "Forum on Assessment," Charleston, W.V.

SELECTED PROFESSIONAL CONFERENCE PAPERS AND PRESENTATIONS

Lewis, D. & Cook, R. (2018, July) *Embedded Standard Setting: Integrating Cut Score Estimation into Principled Assessment Frameworks.* Paper presented at the 11th Conference of the International Test Commission, Montreal, QC

Lewis, D. & Cook, R. (2018, June) *Embedded Standard Setting: Aligning Standard Setting Methodology with Contemporary Assessment Design Frameworks.* Paper presented at the meeting of the National Conference on Student Assessment, San Diego, CA

Lewis, D. & Bruce, W. (2018, April). National Education Policy as a Driver of Assessment Design. Training session at the annual meeting of the National Council on Measurement in Education, NYC.

Lewis, D. & Cook, R. (2018 ,April). Embedded Standard Setting. Paper presented at the annual meeting of the National Council on Measurement in Education, NYC.

Lewis, D (2017, November). *An Innovative Approach: Score Reporting on a New English Language Proficiency Assessment. Coordinated symposium at the California Educational Research Association annual meeting, Anaheim, CA.*

Lewis, D (2017, June). ELPA21: Score Interpretation and Standard Setting. Coordinated symposium at the Council of Chief State School Officers National Conference on Student Assessment, Austin, TX.

Lewis, D (2017, April). Engineered Cut Scores: Aligning Standard Setting Methodology with Contemporary Assessment Design Principles. Coordinated symposium at the National Council on Measurement in Education, San Antonio, TX.

Lewis, D (2017, April). ELPA21: Standard Setting and Score Interpretation. Coordinated symposium at the National Council on Measurement in Education, San Antonio, TX.

Lewis, D. (2016, June). Engineered Cut Scores: Aligning Standard Setting Methodology with Contemporary Assessment Design Principles. Coordinated symposium at the Council of Chief State School Officers National Conference on Student Assessment, Philadelphia, PA.

Lewis, D. (2015, April). Development and validation of a technology-enhanced score report. Presentation at the annual Innovations in Testing conference, Scottsdale, AZ.

Lewis, D. (2014, April). Development and validation of a technology-enhanced score report. Presentation at the annual meeting of the National Council on Measurement in Education, Philadelphia.

Lewis, D., Ekstrand, J., & Butler, M. (2013, December) Technology enhanced score reports: An R & D study of proof of concept. Presentation at the annual meeting of the California Educational Research Association, Los Angeles.

Clauser, J. & Lewis, D. (2013, April). The effect of summer learning loss on teacher evaluation. Presentation at the annual meeting of the National Council on Measurement in Education, San Francisco.

Lewis, D. M. (2011, April). Acuity and growth on the Georgia Criterion-Referenced Competency Tests in Clayton County: A quasi-experimental study. Presentation at the Annual Meeting of the American Educational Research Association, New Orleans.

Boughton, K. A., Gao, F., Lewis, D., & Kim, D. (2010, May). Technical issues in vertical scaling of benchmark assessments. In D. Lewis (Organizer), Technical issues in benchmark assessments. Symposium presented at the Annual meeting of the National Council on Measurement in Education, Denver.

Lewis, D. M. (2009, June). Policy versus data driven performance levels. Presentation at the CCSSO National Conference on Student Assessment, Los Angeles.

Lewis, D. M. (2009, June). Evaluating the effectiveness of large-scale benchmark assessments. Presentation at the CCSSO National Conference on Student Assessment, Los Angeles.

Lewis, D. M. & Michaels, H. (2009, April). From the publisher's perspective: Benchmark assessment with formative purposes. Presentation at the 2009 Annual Meeting of the American Educational Research Association, San Diego.

Lewis, D. M. (2008, June). Understanding growth and value-added models: Informing policy and practice. Presentation at the 2008 Council of Chief State School Officers National Conference on Large-Scale Assessment, Orlando.

Lewis, D.M. (2008, December). Informative Assessments. Presentation at the annual meeting of the California Educational Research Association, Rancho Mirage, CA.

Lewis, D. M. (2007, December). Fundamentals of educational measurement. Pre-conference workshop at the Texas Assessment Conference, Austin.

Lewis, D. M. (2007, June). Policy and test Design for the next reform. Presentation at the Council of Chief State School Officers National Conference on Large-Scale Assessment, Nashville.

Dwyer, A, Boughton, K., Yao, L., Steffen, M., & Lewis, D. (2006, April). A comparison of subscale score augmentation methods using empirical data. Paper presented at the annual meeting of the National Council on Measurement in Education, San Francisco.

Lewis, D. M. (2006, June). Aligning Policy and Methodology: Examples from Two States. Presentation at the CCSSO National Conference on Large-Scale Assessment, San Francisco.

Lewis, D. M. & Haug, C. (2004, April). A standard setting odyssey: On a quest for cross-grade consistency. In (H. Huynh, organizer) Vertically moderated standards: Assumptions, case studies, and applications to school accountability and NCLB adequate yearly progress, an invited symposium at the annual meeting of the National Council on Measurement in Education, San Diego.

Lewis, D. M., Haug, C., & Bruckhart, G. (2003, June). Standard setting under the No Child Left Behind Act. Presentation at the CCSSO Large-Scale Assessment Conference, San Antonio.

Yao, L., Patz, R. J., Chia, M., Lewis, D. M., & Hoskens, M. (2003, April). Hierarchical and multidimensional models for vertical scaling. Paper in D. Lewis (organizer), Issues in Vertical Scaling under Common Item Designs, a symposium at the 2003 annual meeting of the National Council on Measurement in Education, Chicago.

Lewis, D. M., Patz, R. J., Sheinker, A., & Barton, K. (2002, April). Reconciling standardization and accommodation: Inclusive norms and inclusive reporting using a taxonomy for testing accommodations. Paper presented at the 2001 annual meeting of the American Educational Research Association, New Orleans.

Lewis, D. M. (2002, April). Standard Setting with Vertical Scales. Paper presented at the 2002 annual meeting of the National Council on Measurement in Education, New Orleans.

Dawber, T. & Lewis, D. M. (2002, April). The cognitive experience of Bookmark Standard Setting participants. Paper presented at the 2002 annual meeting of the American Educational Research Association, New Orleans.

PROFESSIONAL AFFILIATIONS

- American Education Research Association
- National Council of Measurement in Education

PROFESSIONAL SERVICE

- NCME Mentoring Program Mentor (2017, 2018)
- AERA Division D International Committee Member, 2013-2015
- AERA Division D, Mentoring Committee Chair, 2012-2013
- AERA Division D, Mentoring Committee Vice-Chair, 2011-2012
- Journal Reviewer, 2000-Present
    - *Educational Measurement: Issues and Practices*
    - *Educational Assessment*
    - *Career Development Quarterly*
    - *Journal of Educational Measurement*

Brent Garrett, Ph.D.
Garrett Consulting, LLC
4325 Statton Rd.
Louisville, KY 40220
(502)762-3515
brent@bgarrettconsulting.net

Work Experience

Garrett Consulting, LLC **6/93 - Present**

- *State Personnel Development Grants* (65% FTE) - Lead evaluator on State Personnel Development Grants (SPDGs) for Delaware, Georgia, Mississippi, and Nevada. Activities evaluated include early literacy, low incidence initiatives, MTSS for academics and behavior, and instructional consultation. (10/2012 – Current)
- *VT State Systemic Improvement Plan (SSIP)* (15% FTE) - Lead evaluator on VT SSIP, focusing on improved academic and behavioral outcomes for students with behavioral disorders.

Pacific Institute for Research and Evaluation **10/2004 - Present**

- *Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores* (SCILLSS) (5%). Activities including evaluating the EAG-funded initiative to improve large-scale science assessments in Nebraska, Wyoming, and Montana.

Other Projects Worked On Previously through Garrett Consulting and PIRE:

Education Assessment

- *National Center and State Collaborative General Supervision Enhancement Grant* – External evaluator to assess the degree of quality, relevance, and utility of efforts to develop a model alternate assessment on alternate achievement standards. (10/2010 - 9/2015)
- *Evaluating the Validity of English Language Proficiency Assessments* (EVEA). Evaluated a collaborative project across seven states that developed a joint validity argument and designed a series of studies to address states English Language Proficiency assessments. (2009 – 2012)
- *New Hampshire Enhanced Assessment Initiative*, funded by the Office of Elementary and Secondary Education at the US Department of Education. A five-state collaborative, with the evaluation component funded by a subcontract with the University of Kentucky. Assist in evaluating an effort to develop more technically sound alternate assessment systems. (2004 – 2007)
- *Kentucky's General Supervision Enhancement Grant*, (2004-2006) funded by the Office of Special Education and Rehabilitative Services at the US Department of Education. Assist in evaluating initiatives related to alternate assessments for students with significant cognitive disabilities, early childhood outcomes and standards, and early childhood transition. (2004 – 2007)

Special Education

- *Kentucky Department of Education* – Conducted two rounds of evaluation of Kentucky's nine Special Education Cooperatives. (2012 – 2014)
- *Central Kentucky Educational Cooperative* – Continued evaluation work for one of Kentucky's nine Special Education Cooperatives when KDE dropped requirement for evaluation. (2014- 2015)
- *Kentucky Autism Training Center* – Supported the evaluation of the Center's work with Kentucky's Special Education Cooperatives. (2013)

- *MeTRC* –A University of Kentucky project which investigated an intervention designed to improve the mathematics achievement of 7th grade students with print disabilities. (7/2011 – 6/2013)
- *State Personnel Development Grants* – Lead evaluator on Kentucky's first three SDPGS, (2000 – 2014), Mississippi's first and SPDG (2005-2010, 2011-16), New Hampshire's and Vermont's third SPDG (2007- 2013).
- *Maryland Part C State Performance Plan Indicator 4 Report* - Administered survey, analyzed, and reported on data to support Maryland's Part C Indicator 4 data (2011 – 2013).

General Education

- *Collaborative for Teaching and Learning* – Evaluation consultant for Math/Sciences Partnership grant at Knott County (KY) Schools. (2008 - 2011)
- *Collaborative for Teaching and Learning* – Evaluation consultant for Content Literacy grant at Paducah Independent (KY) Schools. (2008 - 2010)
- *Character Education Technical Assistance Center*. Evaluation consultant for state and school grantees receiving funding through the Office of Safe and Drug Free Schools at the US Department of Education. (2004 – 2007)

History

- *Connecticut Historical Society* – Assisted CHS in developing an evaluation plan to assess the implementation of their strategic plan. (2015-16)
- *Kentucky Historical Society* – Served as external evaluator on an IMLS grant, assessing the impact of Virtual Thinking Strategies on teacher pedagogy and student performance. (7/2013 – 6/2015)
- *Teaching American History* Grants – Coordinated external evaluations for nine TAH projects in OH, KY, and PA, working with state historical societies, regional educational entities, districts and schools. Evaluation outcomes included increased teacher content knowledge, greater use of primary sources, and improved student performance. Evaluation strategies included quantitative and qualitative teacher and student assessments, surveys, lesson plan analyses, classroom observations, and focus groups. (2005 – 2012)

Miscellaneous Fields

- *Residential Care Consortium* - Administered an employee satisfaction survey, analyzed the data, and provided a report on the aggregated agency results and individual reports for each of the participating agencies. (2011- 2012)
- *Providing Rural Interdisciplinary Services for Youth with Mental Health Needs* (PRISYM), funded the Health Resources and Services Administration within the US Cabinet of Health and Human Services, via a subcontract with Eastern Kentucky University. Oversee evaluation efforts to increase the number of graduating students employed by regional mental health centers in eastern Kentucky.
- *Evaluation of Mentoring Initiative for System Involved Youth* – Principal Investigator on a cross-site evaluation of four youth mentoring programs. Funded by the Office of Juvenile Justice and Delinquency Prevention at the U.S. Department of Justice (15%).
- *Southeast Center for Application of Prevention Technologies*. Deputy Director for Evaluation for a regional technical assistance center funded by the Substance Abuse and Mental Health Systems Administration (SAMHSA) within the US Cabinet of Health and Human Services. Oversee internal evaluation efforts, participate in cross-CAPT evaluation activities, and provide evaluation-related technical assistance to state and local prevention programs.
- *Parental Help Seeking for Dental Care*, funded by the National Institute for Dental and Craniofacial Research, via a subcontract with the University of Louisville. The evaluation of an experimental effort to increase the use of dental care by children of Medicaid recipients.

Interdisciplinary Human Development Institute, University of Kentucky 10/92 – 9/04

Projects Worked on While at the Interdisciplinary Human Development Institute:

- *Project Director for the Including Students with Deaf-Blindness in Large Scale Assessment Systems Project.* Responsible for the implementation of a U.S. Department of Education funded research project to better understand how students with deaf-blindness fare in state general and alternate assessment systems. Three manuscripts were accepted for publication. (7/00 – 9/03).
- *Project Director for the Kentucky Alternate Portfolio System Study.* Responsible for the final year of implementation of a U.S. Dept. of Education research project. Provided administrative oversight, conducted data analyses, and completed all final reports. Co-authored one publication. (7/00 – 9/01).
- *Institute Evaluator*. Responsible for developing and implementing Institute-wide evaluation activities. Activities included the implementation of an internal staff survey, external client satisfaction survey, and other assessments to gauge Institute performance. (9/03 – 9/04).
- *Evaluation and Research Consultant for the Alliance for Systems Change/Mid-South Regional Resource Center*. Coordinated and provide guidance to internal evaluation team. Also provided needs-based technical assistance in areas such as data management, program evaluation, proposal development, and alternate assessment for internal staff and personnel working in 9 state departments of education. (7/02 – 9/04).
- *Lead Evaluator for the Kentucky State Improvement Grant I*. Assisted the KY Department of Education in evaluating the State Improvement Grant. Included initiatives related to early childhood transition, positive behavior systems, assistive technology, access to the general curriculum, secondary transition, and parent involvement. (2/03 – 9/04).
- *Project Director for the Kentucky Employment Initiative***.** Responsible for administrating and managing a U.S. Department of Education funded project to improve employment options for students with disabilities at universities and community colleges across Kentucky. Supervised four individuals, managed an annual budget of $100,000, and performed all administrative and management functions. (10/93 - 9/96).
- *Principal Investigator/Project Director for the Community Based Work Transition Program*. Administered a $1.4 million program for the Kentucky Department of Vocational Rehabilitation and the Department of Education. Designed, implemented, and evaluated training and technical assistance to personnel in more than 100 school districts and state agencies participating in a community based work transition program. Was responsible performing all administrative and management functions, as well as training and technical assistance. (10/92-6/00).

Education

University Of Kentucky, Lexington, KY 5/2002
Doctorate of Philosophy, Martin School of Public Policy and Administration
Dissertation – The Role of Policy Entrepreneurs in Policy Diffusion

University Of Kentucky, Lexington, KY 5/2000
Masters in Public Policy and Administration
Martin School of Public Policy and Administration

University Of North Carolina At Greensboro, Greensboro, NC 6/87-12/89
Bachelor of Arts-Mathematics, Secondary Teacher Certification

Sample of Refereed Journal Articles:

Sheppard-Jones, K., Garrett, B, & Huff, M.B. (2007). Community based work experiences for students with significant disabilities: Real world work equals real world success. *International Journal on Disability and Human Development, 6*(1), 47-52.

Towles-Reeves, E., Garrett, B., Burdge, M., and Burdette, P. (2006). What are the consequences? Validation of large scale alternate assessment systems and their influences on instruction. *Assessment for Effective Intervention*. 31(3), 45-57.

Towles-Reeves, E., Kampfer-Bohach, S, Garrett, B., Kearns, J.F., & Grisham-Brown, J. (2006). Are we leaving our children behind? State deaf-blind coordinators' perceptions of large-scale assessments. *Journal of Disability Policy Studies,17*(1), 40-47.

White, M., Garrett, B., Kearns, J.F., & Grisham-Brown, J. (2003). Instruction and assessment: How students with deaf-blindness fare in large-scale alternate assessments. *Research and Practice for Persons with Severe Disabilities,28*(4), 205-213.

Garrett B., Towles, E., Kleinert, H., & Kearns, J.F. (2003). Portfolios in large-scale alternate assessment systems: Frameworks for reliability. *Assessment for Effective Intervention,28*(2),17-28.

Kleinert, H., Garrett, B., Towles, E., Garrett, M., Nowak-Drabik, K., Waddell, C., & Kearns, J. (2002). Alternate assessment scores and life outcomes for students with significant disabilities: Are they related? *Assessment for Effective Intervention. 28*(1),19-30.

Garrett, B., Huff, M., & Sheppard-Jones, K. (2002). Rehabilitation and education partnerships: Nurturing positive communities. *Journal of Rehabilitation Administration, 26(2),123-133.*

Sample of Refereed Presentations:

Garrett, B. and Cooledge, J. (October 2018). *Liberating Progress Monitoring Outcome Data*. National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B., and Weingarten, Z. (October 2018). *Assessing MTSS Implementation*. National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B., and McBride, J. (October 2017). *Increasing School's Capacity to Support Students' Communication Competency*. National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B., and Bowers, J. (October 2017). *Assessing Professional Learning via Data Management Systems.* National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B., and Jenks, A. (October 2016). *Assessing the Effectiveness of Coaching in New Hampshire* National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B. (October 2015). *Marketing the Results of SPDG Initiatives.* National State Personnel Development Grant Meeting. Washington D.C.

Garrett, B. (October 2014). *Creating Useful and Used Training Evaluations*. National State Personnel Development Grant Meeting. Washington D.C.

Mueller, P. & Garrett, B. (November 2010). *Fidelity Instruments and School Burden.* Annual Conference of the American Evaluation Association. San Antonio, TX.

Kearns, J., Lazarus, S., Chartrand, A., Jorgenson, C., and Garrett, B. (July 2009). *What other OSEP Projects Need to Know About Alternate Assessments: A State Personnel Development Grant Perspective.* Office of Special Education Programs Annual Meeting, Washington D.C.

Perumal, C., Mueller, P., & Garrett, B. (November 2008). *Evaluation of Statewide Special Education Initiatives—Current Practices and Future Policies?* Annual Conference of the American Evaluation Association, Denver, CO.

Mueller, P. & Garrett, B. (November 2008). *Evaluating Integrated Intervention Models: Response to Intervention & Positive Behavioral Supports.* Annual Conference of the American Evaluation Association, Denver, CO.

Garrett, B., Cooledge, J., & Russell-Bender, A. (November 2004). *Promoting and Supporting Evaluation in the States: Our Experience with State Improvement Grants*. American Evaluation Association National Meeting. Atlanta, GA.

Thurlow, M., Garrett, B., Zhang, L., & Barton, K. (June 2004). *What Item Level Data Tell Us About Universal Design: Fantasy, Foolishness, or Fuel for Fire?* Council of Chief State School Officers 2004 National Conference on Large-Scale Assessment. Boston, MA.

Burge, M., Garrett, B., & Towles-Reeves, L. (December 2003). *Are We Getting the Change We Want?: A Multi-State Examination of the Consequential Validity of Alternate Assessments*. 2003 Annual TASH Conference. Chicago, IL.

Grisham-Brown, J., Garrett, B., Norman, J., & Russo, J. (October, 2003). *Including Students with Deaf-Blindness in Large-Scale Assessment Systems – A Final Report.* National State Deaf-Blind Coordinators Conference, Washington DC.

Grisham-Brown, J., & Garrett, B. (November, 2002). *Including Students with Deaf-Blindness in Large-Scale Assessment Systems*. National State Deaf-Blind Coordinators Conference, Washington DC.

Garrett, B. (May, 1999). *A Parent's Guide to Transition and Adult Services*. Warren County Transition Fair, Hopkinsville, KY.

Garrett, B. (April, 1999). Conversion to Supported Employment in Kentucky. *Kentucky Arc Conference, Louisville, KY.*

Garrett, B. (February 1997). An Introduction to Personal Futures Planning. Warren County Schools Vocational Parent Advisory Board, Bowling Green, KY.

Garrett, B. (November, 1995). *Best Practices in Vocational Services for Students with Disabilities*. Kentucky Department of Education Special Education Conference, Louisville, KY.

Professional Organizations:

- American Evaluation Association

Honors:

- 2000 - Recipient of the Bill Collins Award for best paper submitted by a doctoral student at the Southeast Conference on Public Administration (SECOPA), Greensboro, NC.
- 1989 - Volunteer of the Year - North Carolina Association for Retarded Citizens.
- 1975 - Eagle Scout. Clarence, NY.

Aneesha Badrinarayan
Senior Advisor, Learning Policy Institute
abadrinarayan@learningpolicyinstitute.org

Professional Preparation

Cornell University, Ithaca NY
B.A. in Biology, Neurobiology and Behavior

University of Michigan, Ann Arbor, MI
M.S. in Behavioral Neuroscience; Learning and Memory

Appointments

Learning Policy Institute, Washington DC
Senior Advisor 2019-Present

Achieve, Washington, DC
Director, Special Projects and Initiatives 2019
Associate Director, Policy and Practice 2017-2019
Senior Associate, Science 2016-2017
Program Associate: Science Content and Policy 2014-2016

Ann Arbor Hands-On Museum, Ann Arbor, MI
Education and Outreach Programs Manager 2013-2014

University of Michigan, Ann Arbor, MI
Research Fellow, National Institutes of Mental Health and Drug Abuse 2011-2013

Key Work Products and Publications

Furtak E, **Badrinarayan A**, Penuel W, Patrick-Stuart R, Duwe S. (in prep) Assessment of Crosscutting Concepts: Creating Opportunities for Sensemaking.

Badrinarayan A. (in prep) Knobs and constants: a framework for designing flexible, equitable, and innovative systems of assessment.

Achieve. (2019) A Framework for evaluating cognitive complexity in science assessments. https://www.achieve.org/cognitive-complexity-science

Badrinarayan A (2019). We love to hate science assessments. Let's do something about it. https://medium.com/@aneeshabadrinarayan/we-love-to-hate-science-assessments-lets-do-something-about-it-6a8881b57ac3

Achieve. (2019) Task Annotation Project in Science. https://www.achieve.org/our-initiatives/equip/tools-subject/science/task-annotation-project-science

Achieve. (2019) Science Task PreScreen. https://www.nextgenscience.org/taskscreener

Achieve. (2019) Science Task Screener. https://www.nextgenscience.org/taskscreener

Achieve. (2019) Transforming Science Assessment: Systems for Innovation. https://www.achieve.org/transforming-science-assessment-systems-for-innovation

Achieve. (2018) Criteria for Procuring and Evaluating High-Quality and Aligned Summative Science Assessments. https://www.achieve.org/science-assessment-criteria

Achieve. (2018) Independent Analysis of the Alignment of the ACT to the Common Core State Standards. https://www.achieve.org/achieve-act-review

Achieve. (2018) Transforming Science Assessment: Challenges and Recommendations for States. https://www.achieve.org/transforming-science-assessment

Achieve, Biological Sciences Curriculum Study, WestEd. (2018) NextGen TIME. www.nextgentime.org

Achieve. (2017) NGSS District Implementation Workbook and Indicators. https://www.nextgenscience.org/news/ngss-district-implementation-workbook

Achieve, NGSS Network. (2016) NGSS Example Bundles. https://www.nextgenscience.org/resources/bundling-ngss

Achieve, NGSS Network. (2015) NGSS Evidence Statements. https://www.nextgenscience.org/evidence-statements

Achieve, NGSS Network. (2015) Classroom Sample Tasks. https://www.nextgenscience.org/classroom-sample-assessment-tasks

Badrinarayan A, Orsini CA, Prater KE. (2012) The Role of the Central Amygdala in Selecting Circuits and Responses. Journal of Neuroscience; 32(25) 8431-8433.

Badrinarayan A, Wescott SW, Vander Weele CM, Saunders BT, Courtier BE, Maren S, Aragona BJ. (2012) Aversive stimuli differentially modulate real-time dopamine transmission dynamics within the nucleus accumbens core and shell. Journal of Neuroscience; 32(45) 159779-90.

Porter-Stransky KA, Wescott SA, Hershman M, **Badrinarayan A**, Vander Weele CM, Lovic V, Aragona BJ. Cocaine must enter the brain to evoke unconditioned dopamine release within the nucleus accumbens shell. Neuroscience Letters; 504 (1) 13-7.

Key Activities and Projects

Lead consultant, innovative approaches 2019-present
Lead advisor on internal and external projects related to innovative high school pathways across content areas.

Assessment lead, Tennessee District Science Network 2019-present
Provide professional learning, expert feedback, and guidance for the development, use and implementation of science tasks developed as part of the Tennessee District Science Network.

Lead, Assessment Inventory for Districts. 2018-present
Support districts and states in conducting inventories of the systems of assessment to better support diverse learners in their communities.

Standards implementation and assessment lead, 50 State Science Network 2016-present
Provide on-demand technical support for the 50 State Science Network (formerly the NGSS Network).

Professional learning leader, EQuIP Suite of tools 2016-present
Provide professional learning for educators related to high-quality instruction, instructional materials, and assessment in science.

Advisor, State Performance Assessment Learning Collaborative 2018-present
Serve as a member of the technical advisory committee for the SPA-LC.

Advisor, Science SCASS 2018-present
Advise and coordinate a group of over 50 state science leaders for the Council of Chief State School Officers.

Advisor, Advancing Tools and Processes for the NGSS 2015-2018
Developing professional learning process for designing and evaluating instructional sequences and embedded assessments.

Contributor, Summit on Evaluating Instructional Materials in Science. 2015-2016
Developing guidelines to support instructional materials selection tools and processes.

Lead content specialist, Video products. 2014-2016
Achieve's content specialist for all video products related to science teaching and learning.

Selected Invited Sessions

Featured Speaker, National Science Teachers Association National Conference. Boston, MA 2020

Keynote Speaker, Michigan Science Teachers Association Annual Meeting. Lansing, MI 2020

Invited Expert, Stanford Center for Assessment, Learning, and Equity Performance Task Design Studio. Palo Alto, CA 2019.

Invited Speaker, Council of State Science Supervisors Annual Meeting. "Coherent and Equitable Systems of Assessment: An Update." St. Louis, MO 2019

Invited Expert and Advisor, Assessment Working Group, Council of State Science Supervisors Annual Meeting. St. Louis, MO 2019.

Invited Speaker, Council of Chief State School Officers Early Childhood Education Working Group. "Student Assessment Inventories for States and Districts." Long Beach, CA 2019.

Invited Speaker, Council of Chief State School Officers Technical Issues in Large Scale Assessment SCASS. "Real Talk: Stop Aligning to the NGSS." Boston MA, 2018.

Invited Speaker, Center for Assessment RILS Conference. "Reconceptualizing Alignment: Criteria to guide the quality and alignment of NGSS assessments." Portsmouth, NH 2018.

Invited Expert, Summit on Crosscutting Concepts. Washington, DC 2018.

Invited Expert, Advancing Coherent and Equitable Systems of Science Education-50 State Meeting. Boulder, CO 2018.

Selected Conference Sessions

Badrinarayan A, Forte E, Smolek T, Tekkumru-Kisa M. (2019) Rethinking Cognitive Complexity for Designing Science Assessments That Matter. National Conference on Student Assessment. Orlando, FL.

Badrinarayan A, Wertheim J, Marion S, Smolek T. (2019) The Role of Assessments in Supporting High-Quality Science Learning: We're Not There Yet. National Conference on Student Assessment. Orlando, FL.

Badrinarayan, A. (2019) Assessing What Matters: Using 3D Assessments as a lever for Equity in the Classroom. National Science Teachers Association National Conference. St. Louis, MO.

Badrinarayan, A. (2019) I Spy a Pattern: Leveraging the Crosscutting Concepts to Support Diverse Students' Sense-making. National Science Teachers Association National Conference. St. Louis, MO.

Badrinarayan, A. (2019) What does it look like? Assessing 3-D learning in the Classroom: How to Navigate Opportunities and Pitfalls. National Science Teachers Association National Conference. St. Louis, MO.

Badrinarayan A, Wertheim J, Penuel W, Krajcik J, Smolek T, Cooper S. (2019) Reconceptualizing Alignment for NGSS Assessments. Paper and symposium prepared for National Association for Research in Science Teaching National Meeting. Baltimore, MD.

Badrinarayan A, Wertheim J, Osbourne J, Pellegrino J, Harris C, Lee O, Davenport J, Krajcik J, Miller E, Herman-Abell C. (2019) Overcoming challenges in Developing and implementing NGSS-aligned instructional materials and assessments. American Educational Research Association Annual Conference. Toronto, ON.

Badrinarayan A, Forte E, Smolek T, Marion S. (2018) Aligned to What: Complex Content Standards As Targets for Assessment Design and Alignment Evaluation. National Conference on Student Assessment. San Diego, CA.

Badrinarayan A, Center M, Epler C, Harris C (2018). From Test to Tasks and Back Again: Novel Approaches to Alignment for NGSS Summative Assessments. National Conference on Student Assessment. San Diego, CA.

Christopherson S, Badrinarayan A, Gong B, McCrae A. (2018) Developing a Common Language to Understand Content Complexity for Alignment Studies of the NGSS. National Conference on Student Assessment. San Diego, CA.

A complete list of invited talks, presentations, and contributing roles is available upon request.

Chad W. Buckendahl
11035 Lavender Hill Dr, Ste 160-433
Las Vegas, NV 89135
Mobile: +1 [redacted]
Email: cbuckendahl@acsventures.com

Education

Ph.D.	2000, Quantitative and Qualitative Methods in Education, University of Nebraska, Lincoln
M.L.S.	1996, Legal Studies, University of Nebraska College of Law
B.A.	1994, Political Science, University of Nebraska, Lincoln

Professional Experience

2016 – pres.	Founding Partner, ACS Ventures, LLC
2007 – 2015	Director of Strategic Partnerships (2014-15), Director of Education, Licensure, & Certification (2010-14), Senior Psychometrician (2007-15), Alpine Testing Solutions
1998 – 2007	Director (2002-07), Assistant Director (2000-02), Research Associate (1998-00), Buros Institute for Assessment Consultation and Outreach, University of Nebraska, Lincoln.

Selected Publications

Journal Articles

1. Buckendahl, C. (2017). Clarifying the blurred lines between credentialing and education exams. *Clear Exam Review,* 26, 23-27.

2. Buckendahl, C. & Gerrow, J. (2016). Evaluating the impact of releasing an item pool on a test's empirical characteristics. *Journal of Dental Education*, *80*, 1253-1260.

3. Davis-Becker, S. & Buckendahl, C. (2013). A proposed framework for evaluating alignment studies. *Educational Measurement: Issues and Practice*, *31*, 23-33.

4. Davis-Becker, S. & Buckendahl, C. (2013). Identifying and evaluating external validity evidence for passing scores. *International Journal of Testing, 13*, 50-64.

5. Buckendahl, C. & Davis-Becker, S. (2012). The appropriateness and use of domain critical errors. *Practical Assessment, Research, & Evaluation*, *17*, 1-12.

6. Davis-Becker, S., Buckendahl, C., & Gerrow, J. (2011). Implications of random ordering on the bookmark standard setting method. *International Journal of Testing, 11*, 24-37.

7. Buckendahl, C., Ferdous, A. & Gerrow, J. (2010). Recommending cut scores with a subset of items: An empirical illustration. *Practical Assessment, Research & Evaluation, 15*.

8. Buckendahl, C., Plake, B., & Davis, S. (2009). Conducting a lifecycle audit of the National Assessment of Educational Progress. *Applied Measurement in Education, 22*, 321-338.

9. Norman, R. & Buckendahl, C. (2008). Determining sufficient measurement opportunities when using multiple cut scores. *Educational Measurement: Issues and Practice, 27*, 37-46.

10. Buckendahl, C., Huynh, H., Siskind, T., & Saunders, J. (2005). A case study of vertically-moderated standard setting for a state science assessment program. *Applied Measurement in Education, 18*, 83-98.

11. Buckendahl, C., Plake, B. & Impara, J. (2004). A strategy for evaluating district developed assessments for state accountability. *Educational Measurement: Issues and Practices, 23*, 17-25.

12. Bhola, D., Impara, J., & Buckendahl, C. (2003). Aligning tests with states' content standards: Methods and issues. *Educational Measurement: Issues and Practices, 22*, 21-29.

13. Buckendahl, C., Impara, J., & Plake, B. (2002). District accountability without a state assessment: A proposed model. *Educational Measurement: Issues and Practices, 21*, 6-16.

14. Yang, Y., Buckendahl, C., Juszkiewicz, P., & Bhola, D. (2002). A review of strategies for validating computer automated scoring. *Applied Measurement in Education, 15*, 391-412.

15. Buckendahl, C., Smith, R., Impara, J. & Plake, B. (2002). A comparison of Angoff and Bookmark standard setting methods. *Journal of Educational Measurement 39*, 253-263.

Books, Book Chapters or Monographs

1. Buckendahl, C. (2017). Understanding credentialing's role in workforce development. In S. Davis-Becker & C. Buckendahl (Eds.), *Testing in the professions: Credentialing policies and practice.* (pp. 1-20). NY, NY: Routledge.

2. Buckendahl, C., Marchand, G., Williams, M., Davis-Becker, S., Wiley, A., Garza, T., Morgan, J., Caridine, E., Hofschulte, E., & Silva, L. (2016). *Evaluation of outcomes for education programs in Nevada: Final report*. Carson City, NV: Nevada Department of Education.

3. Buckendahl, C. (2016). Public perceptions of educational assessment. In G. Brown & L. Irvin (Eds.), *Handbook of social and human conditions in assessment.* New York, NY: Taylor & Francis.

4. McCrudden, M., Schraw, G., & Buckendahl, C. (2015). Visual displays in research and testing: Theoretical and practical considerations. In M. McCrudden, G. Schraw, & C. Buckendahl (eds.), *Use of visual displays in research and testing: Coding, interpreting, and reporting data* (pp. 3-13). Charlotte, NC: Information Age Publishing.

5. Foley, B. P. & Buckendahl, C. (2013). Using visual displays to inform assessment design and development. In G. Schraw, M. McCrudden, & D. Robinson (eds.), *Learning through visual displays*. Charlotte, NC: Information Age Publishing.

6. Buckendahl, C. & Davis-Becker, S. (2012). Setting passing standards for credentialing examinations. In G. J. Cizek (Ed.), *Setting performance standards: Foundations, methods, and innovations* (2nd ed., pp. 485-502). NY, NY: Routledge.

7. Davis-Becker, S. & Buckendahl C. (2011). Integration of cognitive demand into licensure and certification exam development. In G. Schraw (Ed.), *Assessment of higher order thinking skills* (pp. 303-326). Charlotte, NC: Information Age.

8. Buckendahl, C. & Foley, B. (2011). A high-stakes uses of intelligence testing: A forensic case study. In J. Bovaird, K. Geisinger, & C. Buckendahl (Eds.), *High stakes testing in education: Science and practice in K-12 setting* (pp. 191-210). Washington, DC: American Psychological Association.

9. Buckendahl, C., Davis, S., Plake, B., Sireci, S., Hambleton, R., Zenisky, A. & Wells, C. (2009). *Evaluation of the National Assessment of Educational Progress: Final Report*. Washington, DC: U.S. Department of Education.

10. Buckendahl, C. & Plake, B. (2006). Evaluating Tests. In S. Downing & T. Haladyna (Eds.), *Handbook of Test Development* (pp. 725-738). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Presentations

1. Buckendahl, C., Mauldin, S., & Hanchar, R. (November, 2019). *Conducting an independent psychometric audit for your certification program*. Presentation at the annual meeting of the Institute for Credentialing Excellence. San Diego, CA.

2. Buckendahl, C., Roschewski, P. Middlestead, A., Pinsonneault, L., & Loving-Ryder, S. (June, 2019). *Equity: The "dance" between practice, policy, and politics.* Presentation at the annual National Conference on Student Assessment. Orlando, FL.

3. Buckendahl, C. (March, 2019). *Are we testing our kids too much: An interactive debate*. Presentation at the annual meeting of the Association of Test Publishers. Orlando, FL.

4. Buckendahl, C., Kavanaugh, J., & Barnhill, G. (November, 2018). *Cut to the core: Strategies for practice analysis*. A presentation at the annual meeting of the Institute for Credentialing Excellence. Austin, TX.

5. Buckendahl, C., Forte, E., & Donahue, B. (September, 2018). *Assessment literacy for policymakers*. Presentation at the annual meeting of E-ATP. Athens, Greece.

6. Buckendahl, C. (June, 2018). *Data, data, data. . . Now what do we do?* Discussant for presentations at the annual NCSAt. San Diego, CA.

7. Buckendahl, C. (April, 2018). *Standard setting studies: Exploring frameworks, timelines, and methodologies*. Invited presentation at the annual meeting of the National Conference of Bar Examiners. Philadelphia, PA.

8. Buckendahl, C., Dyer, J., Svensson, C., Eatchel, N., & Way, W. (February, 2018) *Value of testing: A panel discussion*. Presentation at the annual meeting of the Association of Test Publishers. San Antonio, TX.

9. Buckendahl, C., Carroll, S., & Ellis, W. (October, 2017). *Legal considerations when credentialing programs are interpreted as employment tests*. Presentation at the annual meeting of ICE. New Orleans, LA.

10. Buckendahl, C. (April, 2017). *Applying the Standards to Gulino: An expert witness perspective*. Paper presented at the annual meeting of the National Council on Measurement in Education. San Antonio, TX.

Consultation

1. National Conference of Bar Examiners: Provide stakeholder engagement research, program design, and test design consultation for the bar examination of the future. (2018-present).

2. Standards and Testing Agency (STA) of the United Kingdom: Provide technical advisory services regarding pupil academic assessment as part of an external committee. (2014-present).

3. Mississippi Department of Education (MDE): Serve on state TAC regarding statewide student assessment and accountability program. (2013-present).

4. National Council of Architectural Registration Boards (NCARB): Provide program design, test design, psychometric consultation, test development and related services. (2011-15).

5. Nevada Department of Education: Provide general psychometric and policy consultation on educational assessment programs in reading, mathematics, science, and writing as chair of their TAC. (2008-present)

6. National Dental Examining Board of Canada (NDEB): Provide psychometric consultation for development, validation, and policy on written and OSCE examination programs for dental licensure. (2006-present)

7. U.S. Department of Education (ED): Principal Investigator for the Congressionally mandated evaluation of NAEP. Coordination of research activities, TWG, and documenting activities and findings. (2004-2009)

8. American Dental Examinations (ADEX): Provide psychometric consultation on exam development, technical quality, and legal defensibility for proposed national clinical examinations in dentistry and dental hygiene. (2004-present)

9. Nebraska Department of Education: Provide measurement and testing consultation services for the state Assessment and Accountability program; serve as chair of the Governor-appointed state's TAC. (1999-present)

10. Oklahoma Commission for Teacher Preparation: Provide psychometric consultation services for a teacher licensure program. (1998-present)

KRISTEN HUFF
[redacted]

EDUCATION

Doctor of Education
Measurement, Research and Evaluation Methods Program
University of Massachusetts Amherst
Degree conferred: May 2003
Dissertation Title: *An item modeling approach to descriptive score reports*

Master of Education
Educational Research, Measurement, and Evaluation
University of North Carolina at Greensboro
Degree conferred: May 1996

Bachelor of Arts
Religious Studies, Sociology
University of North Carolina at Greensboro
Degree conferred: December 1992

PROFESSIONAL EXPERIENCE SINCE 1994

Vice President, Assessment and Research
Curriculum Associates, Inc.
June 2016 - present

Vice President, Research Strategy and Implementation
ACT, Iowa City, IA
June 2015 – May 2016

Senior Fellow, Assessment
Regents Research Fund, University of the State of New York, New York, NY
November 2010 – April 2015

Primary lead on assessment design and psychometrics for the NY State Department of Education in the design of comprehensive assessment system to measure readiness of students for college and career. New York Leadership Team representative for the PARCC Common Core Assessment Consortium; Chair, PARCC Research Operational Working Group.

Senior Research Scientist, Research and Development
The College Board, New York, NY
November 2009 – November 2010

Primary R&D liaison for all externally-funded research proposal development. Serve as assessment design expert on new College Board initiatives. Collaborate with and mentor junior staff on research projects to advance theory and practice of evidence-centered assessment design; setting performance standards; and integrating cognitively-based assessment design theory and practice into College Board assessment initiatives.

Senior Director, Assessment Design, Research and Development
The College Board, New York, NY
July 2007 – October 2009

Major projects include: Design and execution of evidence-centered assessment design and psychometric improvements for Advance Placement Exams; development and execution of the research agenda to support the SAT, PSAT/NMSQT, and ReadiStep instructionally-relevant descriptive score reports. Primary R&D liaison for all College Board proposals to funding organizations (e.g., NSF, IES, Gates Foundation). Responsible for the leadership and direction of the Assessment Design Team, and member of R&D's Senior Staff Team.

Co-PI for NSF DRL Instructional Materials Development Grant (#0903151) "From Research to Practice: Redesigning AP Science Courses to Advance Science Literacy and Support Learning with Understanding" Jim Pellegrino, PI (University of Illinois, Chicago)

Co-PI on NSF DR K12 Challenge 1 Proposal (#08-609) "Framing the Question: Developing a Coherent Standards-based Science Assessment Framework for Grades 6-8 and 9-12" Wayne Camara, PI (College Board)

Primary R&D liaison for several other NSF and IES proposals in development.

Senior Director, K-12 Research, Research and Development
The College Board, New York, NY
July 2004 – June 2007

Responsible for the development and implementation of research and evaluation agendas for all K-12 College Board Programs and special initiatives, including but not limited to Advanced Placement™, CollegeEd™, and SpringBoard™. Managed vendor-selection process and vendor management for several research projects and program evaluation projects. Directed all aspects of the redesign of AP exams, College Board's Study Skills Inventory, and led the development and execution of the College Board's diagnostic research agenda to support both the SAT and the PSAT/NMSQT. Responsible for the leadership and direction of the K-12 Research Team.

Managed three-year evaluation of NSF-funded Video-supported Math Professional Development project. PI, Jim Choike, Oklahoma State University. Vendor: Westat.

Associate Research Scientist, Research and Development
The College Board, New York, NY
July 2003 – June 2004

Responsible for the research and development of descriptive score reports for the new SAT. Management of the design and development of a new learning and study skills assessment.

Group Leader, English Language Assessment Analysis Team
Center for Statistical Analysis, Research and Development
Educational Testing Service, Princeton NJ
January 2003 – June 2003

Responsible for the oversight of several major operational testing programs (e.g., TOEFL PPT, TOEIC, TOPE, TSE, TAST, TWE) as well as programs undergoing development (e.g., Next Generation TOEFL). Responsible for the direction and management of ten team members.

Measurement Statistician, English Language Assessment Analysis Team
Center for Statistical Analysis, Research and Development
Educational Testing Service, Princeton, NJ
September 2001 - December 2002

Psychometric representative on large, diverse team to develop Test of English as a Foreign Language (Next Generation TOEFL) and the Test of Professional English (TOPE) using evidence-centered assessment design.

Research Associate, Medical College Admission Test (MCAT)
Association of American Medical Colleges, Washington DC
January 1997 - August 1999

Responsible for the MCAT Predictive Validity Research Study, as well as initiating and coordinating the MCAT Graduate Student Research Program.

Project Manager, Technical Analysis Group for the National Board of Professional Teaching Standards
Center for Educational Research and Evaluation, University of North Carolina at Greensboro
August 1996 - December 1996

Responsible for the evaluation of adverse impact reports for several NBPTS certification exams and the supervision of graduate student work on these reports.

PROFESSIONAL ACTIVITIES

- NCME Board of Directors, elected 2014 (three-year term)
- New York State Education Department Technical Advisory Committee, 2015 -
- Louisiana Department of Education Technical Advisory Committee, 2013 – 2015
- NAEP Technical Advisory Committee on Standard Setting, 2014 - 2016
- AICPA Technical Advisory Committee, 2014 –
- Achievement Network Technical Advisory Committee, 2014 – 2015
- Program Chair, AERA Cognition and Assessment Special Interest Group, 2012-13
- AERA Division D Secretary, elected 2012 (three-year term)
- Colorado Content Collaborative Technical Advisory Committee, 2012 (one-year term)
- Designer/Facilitator, ECD Training Session, NCME, 2011, 2012, 2013, 2014
- Past President, Northeastern Educational Research Association (NERA), 2009-2010
- President, Northeastern Educational Research Association (NERA), 2008 -2009
- Co-PI for NSF DRL Instructional Materials Development Grant (#0903151) "From Research to Practice: Redesigning AP Science Courses to Advance Science Literacy and Support Learning with Understanding" Jim Pellegrino, PI (University of Illinois, Chicago)
- External Advisor, NSF Grant, "Application of Evidence-Centered Design to States' Large-Scale Science Assessment" PIs (Geneva Haertel, SRI and Bob Mislevy, UMD) 2007 - 2012
- Editorial Board, Applied Measurement in Education, since 2007
- Editorial Board, Journal of Applied Testing Technology, since 2009
- Editorial Board, Educational Measurement: Issues and Practice, since 2016
- Board of Directors, NERA, 2003 –2006
- Chair, NCME Recruitment Committee, 2004 –2006

- Co-Chair, NCME Committee on Assessment Policy, 2009 - present
- Co-Chair, AERA Division D Program, 2007 - 2008
- Co-Editor, *NERA Researcher*, 2002 –2005
- Program co-chair, NERA, 2006
- Member, AERA Division D Program Committee, 2008 - 2009
- Member, NCME Committee on Diversity, 2003 –2004
- Member, NCME Recruitment Committee, 2003
- Member, AERA Division D Mentor Committee, 2005 - 2009
- Reviewer for International Journal of Testing (since 2004), Educational Assessment and Evaluation (since 2004), Educational Measurement Issues and Practice (since 2006)
- Reviewer for AERA and NCME conference papers (since 1997) and reviewer for NERA conference papers (since 2000)
- Regular organizer, chair and discussant at AERA, CCSSO/NCSA, NCME and NERA annual meetings

PUBLICATIONS

Huff, K., & Perie, M. (2016). Determining Content and Cognitive Skills for Achievement Tests. In S. Lane and T. Haladyna, (Eds). *Handbook of Test Development, 2nd edition*. Routledge: New York, NY.

Huff, K., Warner, Z., and Schweid, J. (in press). Large-scale Standards-based Assessments of Educational Acheivement. In A. Rupp and J. Leighton (Eds). *Handbook of Cognitive and Assessment: Frameworks, Methodologies, and Applications*. First Edition. John Wiley & Sons, Inc.

Nichols, P. and **Huff, K.** (in press). Assessment of Complex Thinking (in press). *Validation of Score Meaning in the Next Generation of Assessments*. NCME Book Series. Routledge: New York, NY.

Ercikan, K., Seixas, P., Kaliski, P., & **Huff, K.** (2015). Use of Evidence Centered Design in Assessment of History Learning. In H. Braun (Ed.). *Meeting the Challenges to Measurement in an Era of Accountability*. NCME Book Series. Routledge: New York, NY.

Schneider, M.C., **Huff, K.,** Egan, K.L, Gaines, M.L., & Ferrara, S. (2014). Relationships between item cognitive complexity, contextual response demands, and item difficulty. *Educational Assessment.*

Nebelsick-Gullet, L., Farrar, C., **Huff, K.,** Packman, S., (2014). Design of Interim Assessment for Instructional Purpose: A Case Study Using Evidence Centered Design in Advanced Placement in Informing the Practice of Teaching Using Formative and Interim Assessment- A Systems Approach (Ed.) Lissitz, R.W.

Andrade, H., **Huff, K.,** & Brooke, G. (2013). Using assessment to motivate learners. In R. Wolfe, A. Steinberg, & N. Hoffman (Eds.). *Anytime, anywhere: Student-centered learning for schools and teachers.* Cambridge, MA: Harvard Education Press.

Huff, K., Alves, C., Pellegrino, J. & Kaliski, P. (2013). Using Evidence-Centered Design Task Models in Automatic Item Generation. In Gierl, M. and Haladyna, T. (Eds). *Automatic Item Generation: Theory and Practice* (pp. 102-118). Routledge: New York, NY.

Ewing, M., **Huff, K.**, & Kaliski, P. (2010). Validating AP Exam Scores: Current Research and New Directions. In Sadler, P., Sonnert, G., Tai, R., & Klopfenstein, K. (Eds.), *AP: A Critical Examination of the Advanced Placement Program*. Harvard Education Press.

Hendrickson, A., **Huff, K.**, & Luecht, R.M. (2010). Claims, evidence and achievement level descriptions as a foundation for item design and test specifications. *Applied Measurement in Education, 23:* 4, 358–377.

Huff, K., & Melican, G. (2010), Innovation within constraints: Revising a large-scale college placement exam. In J. A. Bovaird, K. Geisinger, & C. Buckendahl (Eds.), *High stakes testing in education: Science and practice in K-12 settings*. Washington, DC: APA Books.

Huff, K. & Plake, B. (2010). Evidence-centered Assessment Design in Practice. Guest Editors, special issue in *Applied Measurement in Education, 23:* 4, 307 – 309.

Huff, K., & Plake, B. S.(2010) Innovations in Setting Performance Standards for K-12 Test-Based Accountability, *Measurement: Interdisciplinary Research & Perspective*, 8(2), 130-144.

Huff, K., Steinberg, L., & Matts, T. (2010). The promise and challenge of implementing ECD in Large Scale Assessment. *Applied Measurement in Education, 23:* 4, 310 – 324.

Packman, S., Camara, W.J., & **Huff, K.** (2010). A Snapshot of Industry and Academic Professional Activities, Compensation, and Engagement in Educational Measurement. *Educational Measurement: Issues and Practice*, 29(3), 15-24.

Plake, B., **Huff, K.**, & Reshetar, R. (2010). Evidence-centered Assessment Design as a foundation for achievement level descriptions and standard setting. *Applied Measurement in Education, 23:* 4, 342–357.

Huff, K. L., Powers, D. E., Kantor, R. N., Mollaun, P., Nissan, S., & Schedl, M. (2008). Prototyping a new test. In Chapell, C. A., Enright, M. K., & Jamieson, J. M. (Eds.), *Building a Validity Argument for the Test of English as a Foreign Language™*. Routledge: New York.

Huff, K. L. & Goodman, D. (2007). Demand for Cognitively-based Assessment. In J. Leighton & M. Gierl (Eds.), *Cognitive Diagnostic Assessment*. London: Cambridge University Press.

VanderVeen, A., **Huff, K.**, Gierl, M., McNamara, D. S.., Louwerse, M., & Graesser, A. (2007). Developing and validating instructionally relevant reading competency profiles measured by the Critical Reading section of the SAT Reasoning Test™. In D. S. McNamara (Ed.), *Reading Comprehension Strategies: Theories, Interventions, and Technologies*. Lawrence Erlbaum Associates: New York.

Ewing, M., **Huff, K.,** Andrews, M., & King, K. (2006). *Alternate forms reliability study for New SAT skills report*. College Board Research Report.

Huff, K.L. (2006). Review of Automated Essay Scoring: A Cross-Disciplinary Perspective. *International Journal of Testing*.

VITA

SUZANNE LANE

[redacted]

EDUCATION

Ph.D. (Major: Research Methodology, Measurement, and Statistics, Minor: Learning and Development), School of Education, The University of Arizona, 1986.

EMPLOYMENT

1998-present Professor. Research Methodology Program, Department of Psychology in Education, University of Pittsburgh, Pittsburgh, PA.

1992- 1998 Associate Professor. Research Methodology Program, Department of Psychology in Education, University of Pittsburgh, Pittsburgh, PA.

1989- 1997 Faculty Associate, LRDC. Assessment Coordinator, Quantitative Understanding: Amplifying Student Achievement and Reasoning (QUASAR)

1986-1992 Assistant Professor. Research Methodology Program, Department of Psychology in Education, University of Pittsburgh, Pittsburgh, PA.

GRANTS/CONTRACTS (sample)

2012-2014 Principal Investigator (PI), *Research on the Effectiveness of a remote coaching model*, Bill and Melinda Gates Foundation ($293,327)

2012-2013 PI, *Research/Evaluation of the Teacher Evaluation Project for the PA Dept of Education*, PDE and US Department of Ed *Race to the Top Funding* ($189,315)

2010-2011 PI, *Research/Evaluation Work Plan for a Teacher and Principal Evaluation Project for the* PA Dept of Education, Bill and Melinda Gates Foundation ($80,000)

2010 PI, *Common Core Alignment Study*, Pennsylvania Department of Education ($62,384)

2009-2011 Co-Investigator, *Evaluating competency based education and assessment in clinical and translational science*, National Institutes of Health ($114, 340)

2006-2007 Co PI with Clem Stone (PI), *Augmenting subscale scores for the Delaware State Assessment Program*, State Department of Delaware ($9,500)

2006 PI, *Evaluation of the six quality assessment criteria used in the Nebraska School-based Teacher-led Assessment and Reporting System (STARS),* Nebraska Dept of Ed ($15,000)

2001-2004 PI, *Assessing the Consequences of the Pennsylvania System of School Assessment*, Pennsylvania Department of Education, US Department of Education ($677,798)

1995-2000 PI, *Consequences of the Maryland State Performance Assessment Program*, U.S. Department of Education ($776,993.00)

1989- 1996 Assessment Coordinator, Quantitative Understanding: Amplifying Student Achievement and Reasoning (QUASAR), Ford Foundation ($5,000,000.00). Edward Silver, PI

PROFESSIONAL APPOINTMENTS/ELECTIONS/AWARDS (sample)

2016- present ETS Visiting Panel

2015-2016 AERA Top 10 most read article, *Review of Research in Education*

2014-2016 National Academy of Sciences/NRC, Committee on the Evaluation of NAEP Achievement Levels

2014-2017 GRE Board Research Committee, ETS

2013- 2015 U.S. Department of Education Race to the Top Technical Review Panel (appointed)

2013-2018 Member, Committee for NCME Nominations, Career Contribution Award, Mission Fund

2013 Honoree for Teaching, Research and Service, University of Pittsburgh
2012-2014 Chair, Committee for the NCME Career Contributions Award
2011 AERA Award for Outstanding Reviewer
2011 Honoree for Teaching, Research and Service, University of Pittsburgh
2010 AERA Fellow (elected)
2009-2013 Committee for Robert L. Linn Distinguished Research Award
2008-2011 National Technical Advisory Council, U.S. Department of Education (appointed)
2008-2011 Nominations Committee, NCME
2006-2009 Committee on the NCME Career Contributions Award
2005-2016 Management Committee, Revision of *Standards for Educational and Psychological Testing*
2005-2006 AERA Division D Nominating Committee
2005-2006 Co-chair, Committee on the NCME Career Contributions Award
2002-2005 Executive Council, National Council of Measurement in Education (NCME)
2003-2004 President, National Council of Measurement in Education (NCME)
2002-2003 President-Elect, National Council of Measurement in Education (NCME)
2003-2006 National Research Council, Committee on Test Design for K-12 Science Achievement
2002-2003 President Elect, National Council of Measurement in Education (NCME)
2002-2003 Chair, AERA Palmer O. Johnson Memorial Award Committee.
2001-2002 AERA Palmer O. Johnson Memorial Award Committee.
2000-2002 Vice President, Division D, American Educational Research Association
1999-2002 Board of Directors of the National Council of Measurement in Education (NCME)
1997-1999 Secretary and Editor, d'News, Division D, American Educational Research Association
1997-1998 Committee for the NCME Award for Career Achievement
1993-1998 Joint Committee on Revision of the *Standards for Educational and Psychological Testing*
1993-1994 Chair, Committee for NCME Award-Best Technical Contribution to Measurement
1992-1993 Program co-chair, Annual Meeting of the National Council of Measurement in Education

EDITORIAL ACTIVITIES (sample)
2018-2022 Editorial Board, *Educational Measurement*, NCME Edited Book
2016 Lane, Raymond, & Haladyna (Editors) *Handbook of Test Development*, Routledge.
2011-2017 Editorial Board, NCME Book Series
2010-present Editorial Board, *Educational Measurement: Issues and Practice*
2010-2017 Editorial Board, *Educational Researcher*
2006-present Referee, National Science Foundation
2001-present Editorial Board, *Educational Assessment*
2001-2003 Editorial Board, *American Educational Research Journal*
2000-2003 Editorial Board, *Educational Researcher*
1998-2017 Board of Advisory Editors, *Journal of Educational Measurement*
1994-present Board of Editors, *Applied Measurement in Education*
1991-1994 Advisory Board, *Educational Measurement: Issues and Practice*
1989-1991 Associate Editor, *Educational Measurement: Issues and Practice*

ADVISORY COMMITTEES (sample)
2019-2022 Research Advisory Committee, College Board
2019-2022 Technical Advisory Committee, South Carolina Department of Education
2014-2017 Research Advisory Committee, College Board
2014-2018 Technical Advisory Committee, AP Exams, College Board
2014-present Technical Advisory Committee, National Board of Professional Teaching Standards

2011-2017 Technical Advisory Committee, PARCC
2011-2015 Technical Advisory Committee, National Longitudinal Study 2012, Mathematica
2011- present Technical Advisory Committee, Tennessee Department of Education
2010-present Technical Advisory Committee, Texas Department of Education
2010-2017 Technical Advisory Committee, Alternate Assessment Consortium, NCSC
2010 Review Panel, Common Core Standards, NGA and CCSSO
2009-2013 Board of Examiners, American Institute of Certified Public Accountants
2009-2016 Technical Advisory Committee, CBAL, ETS
2008-2009 Expert Panel, Alternate Assessments Based on Modified Achievement Standards, NY State Department of Education and the Center for Assessment
2007-2013 Member/Chair, Psychometric Oversight Committee, AICPA
2006-2007 ETS Constructed Response Design Advisory Panel
2006-2010 National Center for Educational Outcomes Technical Working Group, University of MN
2006-2008 Chair (2008), College Board's Advisory Committee on Research,
2006-2012 GRE® Technical Advisory Committee (TAC)
2005-2008 Co-chair, Technical Working Group, Evaluation of U.S. Department of Education's NAEP
2004-present Technical Advisory Group, New York State Department of Education
2001-present Technical Advisory Panel, New Jersey State Department of Education
2001-present Technical Advisory Panel, Delaware State Department of Education
2001-2003 Advisory Panel, Evaluation of the California High School Exit Examination
2000-2001 Standards Advisory Panel, Educational Testing Service
1999-2004 Board of Trustees, National Center for the Improvement of Educational Assessment
1999-2007 National Technical Advisory Panel on Assessment and Accountability, Kentucky
1999-present Technical Advisory Committee, Pennsylvania State Department of Education
1998-2000 Technical Advisory Committee, Voluntary National Test, American Institute of Research,
1998-1999 National Technical Working Group, Kentucky State Department of Education
1996-1999 Advisory Committee for Research and Development, College Board, NY

PROFESSIONAL PUBLICATIONS- Contributions to National Committee Documents (sample)

National Academy (2017). *Evaluation of the Achievement Levels for Mathematics and Reading on the National Assessment of Educational Progress.*

Technical Working Group, (2008), *Evaluation of the National Assessment of Educational Progress: Technical Working Group Prologue*. Suzanne Lane and Bruno Zumbo (Co-chairs)

National Research Council (2006) *Systems for State Science Assessments*, NRC: Washington, DC.

AERA, APA, & NCME. (1999). *Standards for Educational and Psychological Testing*.

PROFESSIONAL PUBLICATIONS – * Current and Former Students (sample)

Lane, S. & Marion, S. (forthcoming). Validity. In L.L. Cook (Eds). *Educational Measurement.*

Lane, S. (2019). Modeling rater responses in evaluating score meaning. *Journal of Educational Measurement, 56*(3), 653-663..

Quesen, S.* & Lane, S. (2019). Differential Item Functioning for Accommodated Students with Disabilities: Effect of Differences in Proficiency Distributions. *Applied Measurement in Education.*

Lane, S. & Zhang, Y.* (2019). Psychometric considerations for music performance assessments. In T. Brophy (Ed.) *Oxford Handbook on Assessment Policy and Practice in Music.* Oxford University Press.

Lane, S. (2017). The value of response process studies to evaluate score meaning. In K. Ercikan & J.W. Pellegrino (Eds.), Validation of Score Meaning, (pp. 138-145). New York: NY. Routledge.

Lane, S. & Iwatani*, E. (2016). Design of Performance Assessments in Education. In S. Lane, M.R. Raymond, & T.M. Haladyna (Eds.). *Handbook of Test Development* (2nd ed.) (274-293. NY: Routledge.

Lane, S., Raymond, M.R.& Haladyna, T.M. (2016). Test Development Process. In S. Lane, M.R. Raymond, & T.M. Haladyna (Eds.). *Handbook of Test Development* (2nd ed.) (pp. 3-18). New York: Routledge.
Lane, S. (2016). Performance assessment and accountability: Then and Now. In C. Wells & M. Faulkner-Bond (Eds). *Educational Measurement: From Foundations to Future* (356-372). New York: Guilford.
Lane, S. & DePascale, C. (2016). Psychometric considerations for performance-based assessment.. In H. Braun (Ed.), *Meeting the Challenges to Measurement in an Era of Accountability*. NY: Routledge.
Lane, S. & Leventhal*, B. (2015). Psychometric challenges in assessing English language learners and students with disabilities. *Review of Research in Education, 39,* 165-215.
Lane, S. (2014). Performance assessment: The state of the art. In L. Darling-Hammond (Ed.), *Beyond the Bubble Test: How Performance Assessments Support Learning* (133-184). CA: Jossey-Bass.
Lane, S. (2014). Validity evidence based on testing consequences, *Psicothema, 26(1), 127-135.*
Lane, S. (2013). The need for a principled approach to examining indirect effects of test use. *Measurement: Interdisciplinary Research and Perspectives, 11*(1-2), 44-47.
Lane, S. (2013). Security Issues in Writing Assessment. In J.A. Wollack and J. Fremer (Eds.), *Handbook of Test Security* (pp. 101-123). New York, NY: Routledge.
Lane, S. (2013). Performance Assessment in Education. In K.F. Geisinger, *APA Handbook of Testing and Assessment in Psychology*. Washington, DC: APA.
Lane, S., (2012). Consequences of Assessment and Accountability Systems are Integral to the Argument-Based Approach to Validity. *Measurement: Interdisciplinary Research and Perspectives, 10*(1-2), 71-74
Lane, S. (2012). Performance-based Assessment. In J.H. McMillan (Ed.), *SAGE Handbook of Research on Classroom Assessment* (pp.313-330). Thousand Oaks, CA: SAGE.
Lane, S. (2011). Validity and Technical Issues in the Assessment of Higher Order Thinking Skills. In G. Schraw , *Assessment of Higher Order Thinking Skills* (pp. 263-302). Charlotte, NC: IAP.
Lane, S. (2010). *Performance assessment.* Stanford, CA: Stanford University, Stanford Center for Opportunity Policy in Education.
Stone, C.A., Ye, F., Zhu*, X., & Lane, S. (2010). Providing subscale scores for diagnostic information: A case study when test is essentially unidimensional. *Applied Measurement in Education. 23*, 63-86.
Lane, S., Zumbo, B.D. et al. (2009). An introduction to the evaluation of NAEP. *Applied Measurement in Education, 22*, 309-316.
Lane, S. & Tierney*, S. T. (2008). Performance Assessment. In T. Good (Ed.), *21st Century Education*. Thousand Oaks, CA.: SAGE.
Parke*, C. S. & Lane, S. (2008). Examining alignment between state performance assessment and mathematics classroom activities. *Journal of Educational Research*, *101*(3), 132-147.
Parke*, C. S. & Lane, S. (2007). Students' perceptions of a Maryland state performance assessment. *The Elementary School Journal, 107*(3), 302-326.
Camara, W. & Lane, S. (2006). A Historical Perspective and Current Views on the Standards for Educational and Psychological Measurement. *EMIP, 25*(3), 35-42.
Lane, S. & Stone, C.A. (2006). Performance Assessments. In B. Brennan (Ed.), *Educational Measurement*. New York: American Council on Education & Praeger.
Parke*, C. S., Lane, S., & Stone, C. A. (2006). Impact of a state performance assessment program in reading and writing. *Educational Research and Evaluation, 12*(3), 239-269.
Stone, C.A., Weissman*, A., & Lane, S. (2005). Consistency of Student Proficiency Classifications Under Competing IRT Models for State Assessment Program. *Educational Assessment, 10*, 125-146.
Lane, S. (2004). Validity of high stakes assessment: Are students engaged in complex thinking? *Educational Measurement: Issues and Practice, 23*(3), 6-14.
Parke*, C., Lane, S., et al (2003). *Using Assessment to Improve Mathematics Teaching and Learning: Suggested Activities Using QUASAR Tasks, Scoring Criteria, and Student Work.* NCTM.

Stone, C.A. & Lane, S. (2003) Consequences of a state accountability program: Examining relationships between school performance gains and teacher, student, and school variables. *Applied Measurement in Education, 16*(1), 1-26.

Lane, S., Parke*, C.S., & Stone, C.A. (2002). The Impact of a State Performance-Based Assessment and Accountability Program on Mathematics Instruction and Student Learning: Evidence from Survey Data and School Performance. *Educational Assessment, 8*(4), 279-315.

Lane, S., & Stone, C.A. (2002) Strategies for Examining the Consequences of Assessment and Accountability Programs. *Educational Measurement: Issues and* Practice, 21(1), 23-30.

Lane, S., & Silver, E.A. (1999). Fairness and equity in measuring student learning using a performance assessment: In M. T. Nettles (Ed.) *Equity and Excellence in Educational Testing and Assessment*,

Lane, S., Parke*, C. S., & Stone, C.A. (1998). A Framework for Evaluating the Consequences of Assessment Programs. *Educational Measurement: Issues and Practice, 17*(2), 24-28.

Parke*, C.S. & Lane, S. (January 1998). The impacts of a performance assessment in a reform-oriented project. In NC ASCD (Ed.) *The Challenge of Change: Assessment in the 21st Century*, 91-102.

Parke*, C. S. & Lane, S. (1997). Learning from performance assessments in math. *Educational Leadership, 54*(4), 26-30.

Lane, S., Wang*, N., & Magone, M. (1996). Gender related differential item functioning on a middle school mathematics performance assessment. *Educational Measurement: Issues and Practice, 15*(4).

Lane, S., Liu*, M., Ankenmann*, R. D., & Stone, C. A. (1996). Generalizability and validity of a mathematics performance assessment. *Journal of Educational Measurement, 33*(1), 71-92.

Wang*, N., & Lane, S. (1996). Detection of gender-related differential item functioning (DIF) in a mathematics performance assessment. *Applied Measurement in Education, 9*(2), 175-199.

Stein , M.K. & Lane, S. (1996). Instructional tasks and the development of student capacity to think and reason: An analysis of the relationship between teaching and learning in a reform mathematics project. *Educational Research and Evaluation, 2*(1), 50-80.

Cai*, J., Lane, S., & Jakabscin, M. S. (1996). The role of open-ended tasks and holistic scoring rubrics:. In P.C. Elliott (Ed.) *NCTM 1996 Yearbook: Communication in Mathematics,* p. 137-146.

Lane, S., Stone, C. A., Ankenmann*, R. D., & Liu*, M. (1995). Examination of the assumptions and properties of the graded item response model: An example using a mathematics performance assessment. *Applied Measurement in Education, 8(*4), 313-340.

Lane, S., & Silver, E. A. (1995). Equity and validity considerations in the design and implementation of a mathematics performance assessment: The experience of the QUASAR project. In M. T. Nettles (Ed.) *Equity and Excellence in Educational Testing and Assessment,* p. 185-220.

Silver, E. A. & Lane, S. (1995). Can instructional reform in urban middle schools help students narrow the mathematics performance gap?: Some evidence from the QUASAR project. *Research in Middle Level Education, 18*(2), 49-70.

Lane, S., & Glaser, R. (1994). Assessment in the service of learning. In E. De Corte (Ed.) *The International Encyclopedia of Education* (2nd ed.), p. 370-376.

Lane, S., Stone, C., Ankenmann*, R., Liu*, M. (1994). Reliability and validity of a mathematics performance assessment. *International Journal of Educational Research, 21*(3), p. 247-266.

Lane, S. (1993). The conceptual framework for the development of a mathematics performance assessment instrument. *Educational Measurement: Issues and Practice, 12*(2), 16-23.

Silver, E. & Lane, S. (1993). Assessment in the context of mathematics instructional reform: The design of assessment in the QUASAR project. In M. Niss (Ed.), *Cases of Assessment in Mathematics Education,* 59-69.

Paul D. Nichols

[redacted]

EDUCATION

The University of Iowa Iowa City, Iowa	1985-1990	Ph.D.	Educational Psychology
The University of Iowa Iowa City, Iowa	1983-1985	M.A.	Educational Psychology
The University of Iowa Iowa City, Iowa	1980-1983	B.S.	Psychology

RECENT PROFESSIONAL EXPERIENCE

5/2019 -Present

DIRECTOR
Assessment Design
Psychometric Services
NWEA
Portland, OR
Responsible for leading efforts in developing next generation assessments that comingle summative, interim, and formative purposes. Working with the Psychometric and Content departments, ensure that assessment designs, theories of action, score interpretation and intended uses, and research into proofs of concepts are technically defensible and connected to documented customer needs.

4/2017 -4/2019

VICE PRESIDENT
Innovative Research, Design, and Consulting
Research
ACT
Iowa City, IA
Responsible for leading 26 team members in the following four departments in the ACT Research area: Industrial Organizational Psychology; Learning Sciences, Analytics and Navigation; Social, Emotional, and Academic Learning; and Validity and Efficacy.

Lead efficacy and validity research in support of product development and adoption for a product portfolio that spans assessment, learning, behavior, interests, and navigation. Work collaboratively with staff in Research and across areas in ACT to design, develop and collect evidence to support innovative products.

Develop and lead the *ACT Research for Mission-Driven Innovation* (RMDI) program. RMDI is an approach toward organizing, evaluating, and monitoring internally funded research. The program has two goals: 1) Strengthen both ACT's core businesses and ACT's ability to capture innovative new-growth opportunities across the K through career continuum; and, 2) expand the role of ACT Research as thought leaders both inside and outside the company.

2/2015 -4/2017

SENIOR DIRECTOR, DISTINGUISHED RESEARCH SCIENTIST
Research on Assessment and Learning
ACT
Iowa City, IA
Responsible for developing and implementing a research agenda which integrates the most recent findings from research in learning science, assessment and measurement and

technological innovations with best practices in applied studies and assessment design across the ACT continuum of assessments. Works collaboratively with staff in Assessment Design and across areas in Research to design, develop and collect evidence to support innovation for current and future products across a wide spectrum of areas (e.g., academic subject level assessments, general cognitive skills, behaviors and interests).

Lead in the creation of interpretive and use arguments and the evaluation of efficacy and validity arguments. Lead in the planning, execution and documentation of evidence collection to provide an evidentiary basis to address claims and proposed uses associated with existing and new products. This includes working to determine the necessary types of evidence and studies (e.g., surveys, cognitive labs, think aloud, protocol analysis, qualitative methods) required within the practical constraints of existing assessment programs.

5/2012 -2/2015 **PRINCIPAL RESEARCH SCIENTIST**
Pearson
Iowa City, IA
Served in the Center for Next Generation Learning and Assessment supporting the research agenda and leading the evidence centered design efforts for the Performance Assessment Group in the Center for Next Generation Learning and Assessment.

Co-lead of Insight Math, an 18 month project creating solutions and building capacity while developing a prototype for an integrated learning system of activities, personalized feedback, and professional development tied together by a common learning progression. This produced scalable, efficacy-driven solutions and prototypes that can adapt to use outside the research environment.

12/2010 -4/2012 **SENIOR ASSOCIATE**
Center for Assessment
Dover, NH
Responsible for consulting and research on a broad range of issues in educational measurement including:

- Planning and executing applied research in the measurement and testing field
- Advising on the planning and writing of RFPs and ITNs
- Supporting standard setting meetings
- Guiding diagnostic and learning progression-based assessment development
- Supporting innovative large-scale test development
- Advising on the development and implementation of an assessment theory of action

2008-12/2010 **VICE PRESIDENT, RESEARCH SERVICES**
Psychometric & Research Services
Pearson
Iowa City, IA
Responsible for management of the research agenda for Test, Measurement and Research Services. Responsibilities have been increased to include support by Test, Measurement and Research Services of Pearson-wide research in support of product development.

OTHER RECENT PROFESSIONAL ACTIVITIES

2011 **INSTRUCTOR**
Designing scenario-based assessment items using an evidence-centered design framework
Professional Development Course
Annual conference of the American Educational Research Association
April 11, 2011
New Orleans, LA
The course introduces design patterns under the evidence-centered design framework as a

high level tool to guide the design and development of scenario-based, innovative assessment items. The course includes lecture, discussion, and group activities. Participants will use design patterns to: (1) select a scenario topic; (2) identify the focal knowledge, skills and abilities to be assessed; (3) conceptualize sequential scenes and "item ideas"; and (4) identify sources of construct irrelevant variance that may contribute to students' poor performance and ways to reduce the variance through task design.

2013 **FACILITATOR**
Workshop on the Application of Evidence Centered Design to Assessment for the Next Generation Science Standards
Coordinated meeting of the Science and Technical Issues in Large-Scale Assessment (TILSA) CCSSO State Collaborative on Assessment and Student Standards (SCASS)
September 25-26, 2013
A hands-on workshop attended by representatives from approximately 30 states addressing the application of Evidence Centered Design to the development of assessments for the Next Generation Science Standards.

2014 **INSTRUCTOR**
Application of Principled Design and Development in Large-scale Assessment
Professional Development Course
Annual conference of the American Educational Research Association
April 2, 2014
Philadelphia, PA
The course introduced participants to the use of principled approaches, including Evidence Centered Design and Principled Design for Efficacy, for assessment design, development and implementation. Participants reviewed a number or real world examples and completed hands-on exercises.

2016 **CONFERENCE ORGANIZER**
Conference on Assessment as Design Science
August 8 and 9, 2016
Iowa City, Iowa
Organized a conference, hosted by ACT, that involved seven thought leaders in the assessment field in a 12-week project to consider the potential of design science to successfully address challenges for large scale and classroom assessment raised by the next generation of assessments. Design science is the scientific study, using rigorous research methods from the social sciences, and creation of artefacts like serious education games and performance-based tasks as they are developed and used by people with the goal of solving problems and improving practices in peoples' lives. During the conference, presenters shared their experience learning about and shaping their attitude toward design science and their conclusions with regard to the potential of design science.

2017 - present **MEMBER, EXPERT PANEL**
2016 Enhanced Assessment Instruments Grant program (EAG)
Nebraska Department of Education, lead state
This program is administered by the Office of Elementary and Secondary Education at the US Department of Education and is a collaboration between states and independent organizations that addresses critical state needs by strengthening assessment score use and meaning, deepening connections between state and local assessment systems, develops frameworks to evaluate student progress, and builds the capacity of state and local assessment systems to produce complementary and meaningful results. I provide technical advisory input to researchers and developers as they study the research base, consider their options and make decisions, and design, develop, and implement the systems and protocols.

2018 **MEMBER, WORKSHOP**
Classroom Assessment and Learning Progressions/Trajectories

Invited participant in a workshop, organized by Dr. Jere Confrey and Dr. Leanne Ketterlin Geller and funded by Southern Methodist University, on classroom assessment and learning progressions/trajectories. The workshop centered on the intersection of learning progressions/trajectories and classroom assessment with an emphasis on validity and iterative validation efforts. This workshop provided an opportunity to collectively share and learn from the efforts that are underway across the country.

PUBLICATIONS AND REPORTS

Nichols, P. & Gianopulos, G. (in press). Arguing about the effectiveness of assessments for the classroom. *The Journal of Mathematical Behavior.*

Camara, W. J., Mattern, K., Croft, M., Vispoel, S. & Nichols, P. (2019). A validity argument related to the use of college admissions test scores in federal accountability. *Educational Measurement: Issues and Practice*, 38(4), 12-26.

Nichols, P., & Huff, K. (2017). Assessments of complex thinking. In J. Pellegrino & K. Ercikan, *Validation of Score Meaning in the Next Generation of Assessments* (pp. 63-74). Routledge: London

Nichols, P., Lai, E., Koepfler, J., & Kobrin, J. (2016). The role of theories of learning and cognition in assessment design and development. In Jacqueline P. Leighton & Andre A. Rupp (Eds.), *Handbook of Cognition and Assessment* (pp. 15-39). Wiley.

Ferrara, S., Lai, E., Reilly, A., & Nichols, P. (2016). Principled approaches to assessment design, development, and implementation. In Jacqueline P. Leighton & Andre A. Rupp (Eds.), *Handbook of Cognition and Assessment* (pp. 41-74). Wiley.

Nichols, P., Ferrara, S., Lai, E. (2015). Principled design for efficacy: Design and development for the next generation tests. In R. W. Lissitz (Ed.), *The Next Generation of Testing: Common Core Standards, SMARTER-BALANCED, PARCC, and the Nationwide Testing Movement* (pp. 228-245). Charlotte, NC: Information Age Publishing.

Nichols, P. D. & Depascale, C. (2013). Toward a Technical Theory for Systems for Learning: The Role of Information. In H. Jiao & R. W. Lissitz (Ed.), *Informing the practice of teaching using formative and interim assessment: A systems approach.* Charlotte, NC: Information Age Publishing.

Nichols, P. D. (2011). Fulfilling the Promise of the Learning Triangle. *Measurement: Interdisciplinary Research & Perspective*, *9 (2-3)*, 163-165.

Nichols, P. D., Twing, J., O'Malley, K., & Mueller, C. (2010). Standard setting as a measurement process. *Educational Measurement: Issues and Practice, 29 (1),* 14-24.

Nichols, P., & Fulkerson, D. (2010). *Informing Design Patterns Using Research on Item Writing Expertise (Large-Scale Assessment Technical Report 9).* Menlo Park, CA: SRI International.

Snow, E., Fulkerson, D., Feng, M., Nichols, P., Mislevy, R., & Haertel, G. (2010). *Leveraging Evidence-Centered Design in Large-Scale Test Development (Large-Scale Assessment Technical Report 4).* Menlo Park, CA: SRI International.

Way, W.D., Dolan, R.P., & Nichols, P. D. (2009). Psychometric challenges and opportunities in implementing formative assessment. In H.L. Andrade & G.J. Cizek (Eds.), *Handbook of Formative Assessment* (pp. 240-265). New York: Routledge.

Fulkerson, D., Nichols, P. D., Haynie, K., & Mislevy, R. (2009). *Narrative Structures in the Development of Scenario-based Science Assessments (Large-Scale Assessment Technical Report 3)*. Menlo Park, CA: SRI International.

Nichols, P. D., Meyers, J., & Burling, K. (2009). A framework for evaluating and planning assessments intended to improve student achievement. *Educational Measurement: Issues and Practice, 28 (3),* 14-23.

Nichols, P. D., & Williams, N. (2009). Consequences of test score use as validity evidence: Roles and responsibilities. *Educational Measurement: Issues and Practice*, *28 (1)*, 3-9.

Mislevy, R., Liu, M., Cho, Y., Fulkerson, D., Nichols, P., Zalles, D., Fried, R., Haertel, G., Cheng, B., DeBarger, A., Villalba, S., Colker, A., Haynie, K., & Hamel, L., (2009) *A Design Pattern for Observational Investigation Assessment Tasks (Large-Scale Assessment Technical Report 2).* Menlo Park, CA: SRI International.

SELECTED RECENT PROFESSIONAL PRESENTATIONS

Nichols, P. D. (2019, April). A framework for understanding assessment stakeholders' values and needs. In *The influence of stakeholders needs and values on assessment design and reporting.* Invited symposium conducted at the annual meeting of the National Council on Measurement in Education, Toronto, Ontario, Canada.

Nichols, P. D. (2019, April). Fostering and evaluating coherence in assessing learning progressions. In L. R. Ketterlin-Geller (Chair), *Validating theories of learning for classroom assessment design: Sources of evidence*. Symposium conducted at the annual meeting of the American Educational Research Association, Toronto, Ontario, Canada.

Croft, M., Nichols, P. D., & Lai, E. (2018, April). *In the eye of the beholder: Stakeholder perceptions of validity evidence*. Paper presented at the annual meeting of the National Council of Measurement in Education, New York, NY.

Nichols, P. D., & Croft, M. (2017, June). *Constructing and communicating validity arguments for peer review and beyond*. Paper presented at the National Conference on Student Assessment sponsored by the Council of Chief State School Officers, Austin, TX.

Nichols, P. D., Paek, P., & Cheng, B. (2017, April). *Consequences of ignoring opportunity to learn for the psychometric quality of assessments*. Paper presented at the annual meeting of the National Council of Measurement in Education, Austin, TX.

Paek, P., Cheng, B., Nichols, P.D., & Haertel, G. (2017, April). *Modeling the dynamic nature of student learning: A systems approach*. Paper presented at the annual meeting of the National Council of Measurement in Education, Austin, TX.

Nichols, P. (2016, April). *Introduction to systems thinking*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Ferrara, S. & Nichols, P. (2014, October) *Principled design and development for embedding assessment in games and simulated environments: It's no game*. Paper presented at the 2014 Maryland Assessment Research Center Conference on Technology Enhanced Innovative Assessment, College Park, MD.

Nichols, P., & Lai, E. R. (2014, April). *Inclusion of the conventions, practices and values of multiple stakeholders in a validity framework*. Paper presented at the annual meeting of the American Educational Research Association, Philadelphia, PA.

Nichols, P., Lai, E. R., & Steedle, J. (2014, April). *A principled approach to designing reliability studies*. Paper presented at the annual meeting of the National Council of Measurement in Education, Philadelphia, PA.

DAVID K. PUGALEE
Professor of Education
Director, Center for Science, Technology, Engineering, and Mathematics Education
Promoted to Full Professor, UNC Charlotte, 2008

Education and Professional Credentials

Institution and Location	Degree	Completion Date	Field of Study
University of North Carolina at Chapel Hill, Chapel Hill, NC	Ph.D.	5/1995	Curriculum and Instruction with emphasis in mathematics and science education
North Carolina Central University, Durham, NC	M.S.	5/1992	Mathematics
University of Southern Mississippi, Hattiesburg, MS	M.Ed.	8/1990	Curriculum and Supervision
	B.S.	5/1982	
Lee University, Cleveland, TN			Psychology, Education (biology and psychology)

Personal Statement

Dr. David Pugalee is a full professor, and Director of the Center for Science, Technology, Engineering, and Mathematics Education (STEM) at UNC Charlotte. The recipient of millions of dollars in previous grant-funding, Dr. Pugalee has also published works on STEM teaching and learning including recent books *Lesson Imaging in Math and Science* and *Effective Content Reading Strategies to Support Scientific and Mathematical Literacy.* Dr. Pugalee served as part of the writing team for the National Council of Teachers of Mathematics *Navigations* series and the National Council of Supervisors of Mathematics *Great Tasks.* Dr. Pugalee has more than a decade of classroom teaching experience at both the K-12, including mathematics and science, and higher education levels and has led multi-million dollar projects providing PD to school districts across the state of North Carolina related to STEM education.

Positions

Full Professor, University of North Carolina at Charlotte (2008-2017); Associate Professor, University of North Carolina at Charlotte (2002-2008)

Director, Center for STEM Education (2007-2017)

Honors

Recipient UNC Charlotte College of Education Teaching Award, University of North Carolina at Charlotte, 2002.

Finalist for the UNC Charlotte Teaching Fellows Undergraduate Teaching Award,

University of North Carolina at Charlotte, 2004, 2003, 2002, 1999.

EXCEL 2006 Silver Award for Scholarly Journals – Feature Article – "Celebrating 100 Years of Flight: Testing Wing Designs in Aircraft", *Mathematics Teaching in the Middle School,* Awarded by the Society of National Association Publishers.

Institut zur Qualitatsentwicklung im Bildungswesen Visiting Professor, Berlin, Germany, Sept. 2009.

Inaugural Brian Griffiths Commemorative Address, Mathematics into the 21st Century Project, Dresden, German, Sept. 17, 2009.

International Congress on Mathematics Education, 2016, Preservice Elementary Mathematics Education, Topic Study Group Member

Books (Selected)

Stephan, M., Pugalee, D. K., Cline, J. and Cline, C. (2017). *Lesson Imaging in STEM Education.* Reston, VA: Association for Supervision and Curriculum Development.

Pugalee, David K. (2015). *Effective Content Reading Strategies to Develop Mathematical and Scientific Literacy: Supporting the Common Core State Standards and the Next Generation Science Standards.* Lanham, MD: Rowman & Littlefield.

Abedi, J., Domaleski, C., Dunbar, S., Karvonen, M., Marion, S., Pellegrino, J., Perie, M., Pugalee, D., Quenemoen, R., Rickelman, R., & Welch, C. (2009). *Considerations for the Alternate Assessment Based on Modified Achievement Standards (AA-MAS): Understanding the Eligible Population and Applying that Knowledge to their Instruction and Assessment.* New York: New York Comprehensive Center with the New York State Education Department. [http://www.nycomprehensivecenter.org/docs/AA_MAS.pdf].

Pugalee, D. K., Arbaugh, F., Bay-Williams, J., Farrell, A., Matthews, S., & Royster, D. (2008). *Navigating through mathematical connections in the middle school.* Reston, VA: National Council of Teachers of Mathematics.

Nesbit, K., Wallace, J., Pugalee, D. K., Miller, A. C., and DiBiase, W. J. (Eds.). (2001). *Developing teacher leaders in science and mathematics: The role of professional development*. Columbus, OH: ERIC Center for Math., Science and Environmental Ed.

Book Chapters (Selected)

Pugalee, D. K. and Glavich, C. (2017). Developing global understanding through mathematics. In E. F. Sparapani and L. R. McClain, Eds., *Teaching in a Globally-Connected World: Preparing Learners for the Future,* University Press of America.

Bush, S. B., Driskell, S., Niess, M., Pugalee, D., Rakes, C., & Ronau, R. (2015). The impact of digital technologies in mathematics pre-service teacher preparation over four decades. In H. Gillow-Wiles & M. Niess, Eds. *Handbook of Research on Teacher Education in the Digital Age*. Hershey, PA: IGI Global, 1.

Thompson, J. L., Bethune, K. S., Wood, C. L., & Pugalee, D. K. (2014). Teaching grade-aligned math skills. In Diane M. Browder & Fred Spooner (Eds.), *More Language Arts, Math, and Science for Students with Severe Disabilities.* Baltimore: Paul H. Brookes Publishing Company, pp. 169-194.

Ronau, R., Rakes, C., Niess, M., Wagener, L. Pugalee, D., Browning, C., Driskell, S.,

& Mathews, S. (2010). New directions in the research of technology-enhanced education. In J. Yamamoto, C. Penny, J. Leight, and S. Winterton (Eds.), *Technology Leadership in Teacher Education: Integrated Solutions and Experiences.* Hershey, PA: IGI Global.

Land, L., Pugalee, D.K., Denham, A., & Kleinert, H. (2017). Teaching and assessing students with significant cognitive disabilities on math content linked to grade-level standards. In H. Kleinert & J. Kearns (Eds.), *Alternate Assessment for Students with Significant Cognitive Disabilities: An Educators Guide.* Baltimore, MD: Paul H. Brookes Pub.

Ronau, R. N., Niess, M. L., Browning, C., Pugalee, D., Driskell, S. O., & Harrington, R. (2008). Framing the research on digital technologies and student learning in mathematics. In L. Bell, E. A. Thompson, & L. Schrum, *Framing research on technology and student learning in the content areas*, pp. 13-31. Charlotte, NC: Information Age Publishing

Articles in Referred Journals (Selected)

Martin, C.S., Polly, D., Wang, C., Lambert, R. G., & Pugalee, D. K. (2016). Perspectives and practices of elementary teachers using an internet-based formative assessment tool: The case of Assessing Mathematics Concepts. *International Journal for Technology in Mathematics Education*.

Ronau, R. N., Rakes, C. R., Bush, S. B., Driskell, S. O., Niess, M. L., & Pugalee, D. K. (2014). A Survey of Mathematics Education Technology Dissertation Scope and Quality 1968–2009. *American Educational Research Journal*, 0002831214531813.

Goodson-Espy, T., Cifarelli, V. V., Pugalee, D., Lynch-Davis, K., Morge, S. and Salinas, T. (2014), Applying NAEP to Improve Mathematics and Science Content and Methods Courses for Preservice Elementary and Middle School Teachers. *School Science and Mathematics*, 114: 392–404. doi: 10.1111/ssm.12093

Chelst, K., Edwards, T., Young, R., Keene, K., Norwood, K., & Pugalee, D. (2010). When will I ever use this stuff? *OR/MS Today, 37*(4), 42-45.

Pugalee, D. K., Hartman, K., & Forrester, J. (2008). Assessing middle grades students' quantitative literacy. *Investigations in Mathematics Learning, 1*(2), 35-51.
Schinck, A.G., Neale, H.W., Pugalee, D.K. & Cifarelli, V.V. (2008). Using metaphors to unpack students' beliefs about mathematics. *School Science and Mathematics*, 108(7), 326-333.

Browder, D. M., Wakeman, S. Y., Flowers, C., Rickelman, R., Pugalee. D., Karvonen, M. (2006). Creating access to the general curriculum with links to grade level content for students with significant cognitive disabilities: An explication of the concept. *Journal of Special Education, 41*(1), 2-16.

Pugalee, D. K. (2004). A comparison of verbal and written descriptions of students' problem-solving processes. *Educational Studies in Mathematics, 55,* 27-47.

Douville, P., Pugalee, D.K., Wallace, J.S. (December 2003). Examining instructional practices of elementary science teachers for mathematics and literacy integration. *School Science and Mathematics, 103*(8), 388-396.

Pugalee, D. K., & Robinson, R. (1998). A study of the impact of teacher training in using internet resources for mathematics and science instruction. *Journal of Research*

on Computing in Education, 31(1), 78-88.

Presentations (Selected.

Pugalee, D. K. (2014, October). Unpacking online instruction: A comparative study of communication milieus. *International Conference on eLearning and Innovative Pedagogies,* Portland, OR.

Wang, C., Martin, C., Lambert, R. G., and Pugalee, D. K. (2014, September). Teacher use of formative assessment and its relationship to primary students' mathematical skills. *Mathematics Education for the Future Project, International Meeting, Herceg Novi, Montenegro.*

Seaman, C. & Pugalee, D. (2013). *The North Carolina Elementary Mathematics Add-On License Program*. Joint Mathematics Meetings (American Mathematical Society, Mathematical Association of America), San Diego, CA.

Niess, M.L. & Pugalee, D.K. (2011, August). Assessing K-8 Teachers' Knowledge for Teaching with Technology: A Complex Problem Needing a Comprehensive Assessment System. Paper presented at the International Symposium on Elementary

Niess, M.L. & Pugalee, D.K. (2011, August). Assessing K-8 Teachers' Knowledge for Teaching with Technology: A Complex Problem Needing a Comprehensive Assessment System. Paper presented at the International Symposium on Elementary Mathematics Teaching, Charles University, Prague, Czech Republic.

Morge, S., Cifarelli, V., Goodson-Epsy, T., & Pugalee, D.K. (2011, August). Examining the math content and pedagogical knowledge of pre-service teachers: How Katelyn and Matthew made sense of students' problems. Paper presented at the International Symposium on Elementary Mathematics Teaching, Charles University, Prague, Czech Republic.

Pugalee, D. K. and Niess, M.L. (2011, April). A Comprehensive approach to assessing TPACK as an interdisciplinary construct. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Ronau, R. N., Rakes, C.R., Niess, M.L., Pugalee, D.K., Driskell, S.O., & Bush, S. (2011, January). Research in mathematics instructional technology: Current trends and future demands. Association of Mathematics Teacher Educators, Irvine, CA.

Pugalee, D.K. (October, 2010). Reaching future engineers through motorsports engineering. Poster presented at the World Congress of Engineering Ed., Buenos Aires, Argentina.

Grant Activities (Selected)

Ramaprabhu, P., Harischandra, P., Xu, T., Uddin, M., & Pugalee, D. (2020). *IGE Reimagining the STEM Doctorate: The Pathways to Entrepreneurship PAtENT Program.* National Science Foundation ($500,000).

Wickliff, A., Pugalee, D.K., & Rhodes, L. (2019). *STEM Student Research Strategic Partnership.* DOD DA Research, Development, and Engineering Command. ($86,000).

Pugalee, D.K. and Raja, S. (2019). Research Apprenticeship in Engineering. Association for the Advancement of Science. ($15,000)

Maher, M. Cao, L. Pugalee, D. K., Rorer, A., & Doradachi, M. (2018). *Collaborative Research: Developing a Systemic, Scalable Model to Broaden Participation in Middle School Computer Science.* National Science Foundation. ($502,822).

Karvonen, M., Koebly, S., Wakeman, S., & Pugalee, D. K. *5E Model Professional Development in Science Education for Special Educators (5E-SESE).* Institute of Education Sciences. ($1,4000,000).

Fernandez, A., Pugalee, D.K., and Harris, K. (2017). *Culturally Relevant Educational Strategies for Mathematics Teaching.* National Science Foundation. ($1,118,000).

Kissau, S., Kolano, L., Stephan, M., and Pugalee, D.K. (2017). *Beyond the North Star: Mastering Common Core Standards through Innovative Professional Development of Teachers in High Needs Schools*, UNC General Administration. ($279,957).

Pugalee, D.K., Cifarelli, V., Stephan, M., and Polly D. (2016). NCQuest: Elemeentary Mathematics Add-On License. North Carolina General Administration, ($178,000, funded).

Pugalee, D.K., Asala, K., Leilabady, P., Popejoy, K., and Stephan, M. (2012-2017). *49er Teach Noyce Scholars Program.* National Science Foundation, Award Number: DUE-1239935. ($698,123 Funded).

Pugalee, D.K., Friel, S., Cifarelli, V., Polly, D., Ringer, K., Stephan, M. (2012-2015). *Assessment Practices to Support Mathematics Learning and Understanding for Students (APLUS).* North Carolina Department of Public Instruction Mathematics and Science Partnership Program. ($4,767,550).

Pugalee, D.K., Royster, D., Polly, D. (2009, January). *Content Development to Teach Mathematical Investigations.* North Carolina Department of Public Instruction Mathematics and Science Partnership Program. ($2,119,944).

Young, R., Chelst, K.R., Edward, T.G., Norwood, K. & Pugalee, D. (2008-2013). *MINDSET (Mathematics INstruction using Decision Science and Engineering Tools)* with NC State University, NSF DR K-12. Funded $3,100,100.

Joseph S. Krajcik

VITA OF Joseph S. Krajcik, Director of the Institute for Collaborative Research for Educational Assessment and Teaching Environments for Science, Technology, Engineering and Mathematics (CREATE for STEM), College of Natural Science, Lappan-Phillips Professor of Science Education and the College of Education, Professor of Science Education, Michigan State University.

PERSONAL DATA

School Address	College of Education Michigan State University East Lansing, Michigan
email:	krajcik@msu.edu
website:	http://create4stem.msu.edu
twitter:	@krajcikjoe

ACADEMIC BACKGROUND

Ph.D. Science Education, The University of Iowa; August 1986.

M.S. Curriculum and Instruction, Science Education, University of Wisconsin-Milwaukee; December 1982.

B.A. Chemistry and Broad Field Natural Science Certification, University of Wisconsin-Milwaukee, 1976; Communication and Philosophy, University of Wisconsin-Milwaukee, 1973.

Certification and licenses:

- State of Wisconsin Permanent Teaching Certificates: Grades 9-12 License 600 Science (All); Grades 9-12 License 610 Chemistry.
- Open-Water Scuba Diver, Summer, 2004 (Belize Academy of Diving, PADI).
- Advanced Open-water Scuba Diver, Summer, 2006 (Belize Academy of Diving, PADI).

ACADEMIC EXPERIENCE

Sept. 2011	Director the Institute for Collaborative Research for Educational Assessment and Teaching Environment for Science, Technology, Engineering and Mathematics (CREATE for STEM), and Professor of Science Education, Michigan State University.
Sept. 2009 - 2010	Distinguished Professor, Ewha Womans University, Institute for Global Science, Society and Technology, Seoul, South Korea.
Sept. 2007 - 2011	Co-director, the IDEA Institute, University of Michigan.
2006 - 2011	Associate Dean for Research, School of Education, University of Michigan.
Jan. - July 2005	Weston Visiting Professor of Science Education, Weizmann Institute of Science, Israel.
Sept. 1998 - 2011	Professor, Educational Studies, School of Education, University of Michigan
1990 - 1994	Assistant Professor, Associate Professor, Educational Studies, School of Education, University of Michigan.
1986 -1989	Assistant Professor, Department of Curriculum and Instruction, College of Education, University of Maryland.
1983 - 1986	Instructor, Science Education, University of Iowa. Courses taught include: Science Methods II; Resources and Teaching Strategies; Introduction to Teaching; Computer Applications in Science Teaching. Also served as a Student Teacher Supervisor and Coordinator for Molecular Biology for the Secondary Science Training Program.

1976 - 1983	Marquette University High School, Milwaukee, Wisconsin. Science Teacher for Accelerated Chemistry, Chemistry and Physical Science
1981 - 1983	Marquette University Upward Bound Program, Milwaukee, Wisconsin. Science Teacher for Advanced Chemistry, Chemistry and Physics. Also involved in curriculum development for Accelerated Chemistry, Summers.
1979 - 1981	Milwaukee Area Technical College; Evening School; Milwaukee, WI. Instructor for High School Chemistry and General Science.
1974 - 1977	University of Wisconsin-Milwaukee, Department of Learning Skills, Milwaukee,

PUBLICATIONS

Journal Publications (designates refereed manuscripts; + designates solicited manuscripts)*:

*Fortus, D., Kubsch, M., Bielik, T., Krajcik, J., Lehavi, Y., Neumann, K., ... & Touitou, I. (2019). Systems, transfer, and fields: Evaluating a new approach to energy instruction. *Journal of Research in Science Teaching*.

* Miller, E.C. & Krajcik, J.S. (2019. Promoting deep learning through project-based learning: a design problem. *Disciplinary and Interdisciplinary Science Education Research,* 1,7. https://doi.org/10.1186/s43031-019-0009-6

*Harris, C., Krajcik, J., Pellegrino, J. and DeBarger, A, (2019). Designing Knowledge-In-Use Assessments to Promote Deeper Learning. *Educational Measurement: Issues and Practice*.

*Nordine, J., Krajcik, J., Fortus, D., & Neumann, K. (2019). Using Storylines to Support Three-Dimensional Learning in Project-Based Science. *Science Scope*, *42*(6), 85–91.

*Nordine, J., Fortus, D., Lehavi, Y., Neumann, K., & Krajcik, J. (2018). Modelling energy transfers between systems to support energy knowledge in use. Studies in Science Education, 54(2), 177–206. https://doi.org/10.1080/03057267.2018.1598048

*Kolonich, A., Richmond, G., & Krajcik, J. (2018). Reframing Inclusive Science Instruction to Support Teachers in Promoting Equitable Three-dimensional Science Classrooms. *Journal of Science Teacher Education*. doi:10.1080/1046560X.2018.1500418.

*Bielik T., Damelin D., & Krajcik J. (2018). Why do Fishermen Need Forests? Developing a Project-Based Unit with Engaging Driving Question. *Science Scope*, Vol. 41.6, 64-72.

*Tapia, Sanchez-Ingrid; Krajcik, J., Reiser, B. (2018). We Don't Know What is the Real Story Anymore": Curricular Contextualization Principles That Support Indigenous Students in Understanding Natural Selection. *Journal of Research is Science Teaching*, 55(3), 348-376, DOI10.1002/tea.21422.

*Damelin, D., Krajcik, J., McIntyre, C., and Bielik, T. (2017). Students making system models: An accessible approach. *Science Scope*, 40(5), 78-82

*Krajcik, J. & Delen, I. (2017). How to support learners in developing usable and lasting knowledge of STEM. *International Journal of Education in Mathematics, Science and Technology*, 5(1), 21-28. DOI:10.18404/ijemst.

+Krajcik, J., & Delen, I. (2017). The Benefits and Limitations of Educative Curriculum Materials. *Journal of Science Teacher Education*, *28*(1), 1-10.

*Krajcik, J., & Delen, I. (2017). Engaging learners in STEM education. *Eesti Haridusteaduste Ajakiri. Estonian Journal of Education*, *5*(1), 35-58. https://ojs.utlib.ee/index.php/EHA/article/view/eha.2017.5.1.02b

*Schneider, B., Krajcik, J., Lavonen, J., Salmela-Aro, K., Broda, M., Spicer, J., Bruner, J., Moeller, J., Linnansaari, J., Juuti, K. and Viljaranta, J. (2016), Investigating optimal learning moments in U.S. and Finnish science classes. *Journal of Research is Science Teaching*, 53: 400–421. doi: 10.1002/tea.21306

*Krajcik, J. 2015. Three-dimensional instruction: Using a new type of teaching in the science classroom. *Science Scope*, 39(3): 16–18.

*Harris, C. J., Penuel, W. R., D'Angelo, C. M., DeBarger, A. H., Gallagher, L. P., Kennedy, C. A., Cheng, B. H. and Krajcik, J. S. (2015), Impact of project-based curriculum materials on student learning in science: Results of a randomized controlled trial. *Journal of Research is Science Teaching*, 52: 1362–1385. doi: 10.1002/tea.21263

* Krajcik, J. (2015), Project-based Science: Engaging Students in 3-dimensional learning. *The Science Teacher*, 81(1), 25 – 27. The National Science Teacher Association.

*Coppola, B. P. and Krajcik, J. S. (2014), Discipline-centered post-secondary science education research: Distinctive targets, challenges and opportunities. *Journal of Research is Science Teaching*, 51: 679–693. doi: 10.1002/tea.21165.

+Krajcik, J. (2014). How to Select and Design Materials that Align to the Next Generation Science Standards, *NSTABlog*. http://nstacommunities.org/blog/2014/04/25/equip/.

*Krajcik, J., Codere, S., Dahsah, C., Bayer, R., Mun, Kongu (2014). Planning Instruction to Meet the Intent of the Next Generation Science Standards, *The Journal of Science Teacher Education*, DOI 10.1007/s10972-014-9383-2, open access manuscript.

*Krajcik, J., McNeill, K. L., Reiser, B., (2008). Learning-Goals-Driven Design Model: Developing Curriculum Materials that Align with National Standards and Incorporate Project-Based Pedagogy. *Science Education,* 92(1), 1-32.

+Krajcik, J.S. (2002). The Value and Challenges of Using Learning Technologies to Support Students in Learning Science. *Research in Science Education*, 32(4), 411-415.

*Krajcik, J.S., Blumenfeld, P., Marx, R.W., Bass, K.M., Fredricks, J., & Soloway, E. (1998). Middle school students' initial attempts at inquiry in project-based science classrooms. *Journal of the Learning Sciences*, 7(3&4),313-350.

*Krajcik, J., Blumenfeld, P., Marx, R. W., & Soloway, E. (1994). A collaborative model for helping science teachers learn project-based instruction. *Elementary School Journal*, 94(5), 483-498.

Book, handbook, and monograph chapters and commissioned papers: (designates refereed chapters; + designates solicited chapters)*:

*+ Krajcik, J. S., Miller, E. & Chen, I. (in press). Using Project-based Learning to Leverage Culturally Relevant Pedagogy for Sensemaking of Science in Urban Elementary Classrooms. In Atwater, M. M. (Editor), the *International Handbook of Research on Multicultural Science Education,* Spring.

*+ Novak, A. M., & Krajcik, J. S. (2019). A Case Study of Project-Based Learning of Middle School Students Exploring Water Quality. *The Wiley Handbook of Problem-Based Learning*, 551-572.

+ Krajcik, J. & McNeill, K. (2015). Designing and Developing Explanation Tasks. In R.F. Gunstone (ed.) Encyclopedia of Science Education, Dordrecht: Springer.

*+Krajcik, J.S. & Shin, N., (2014). Project-based learning. In Sawyer, R. K. (Ed.), the Cambridge Handbook of the Learning Sciences, 2nd Edition. New York: Cambridge, pages 275 - 297.

*+Krajcik, J.S. & Mun, K. (2014). Promises and Challenges of Using Learning Technologies to Promote Student Learning of Science. In Lederman, N.G. & Abell, S.K. (Eds), the Handbook of Research on Science Education. New York, Routledge, pages 337 – 360.

Books and Monographs: *indicates external review

*Schneider, B., Krajcik, J., Lavonen, J., Salmela-Aro, K. (2020). Learning Science: Crafting Engaging Science Environments. Yale University Press, New Haven and London.

*Krajcik, J.S., & Czerniak, C., (2018). Teaching Science in Elementary And Middle School Classrooms: A Project-Based Learning Approach, Fifth Edition. Routledge, Taylor and Francis Group: New York & London.

*Duncan, R., Krajcik, J., Rivet, A. Editors (authorship is alphabetical) (2016). Disciplinary Core Ideas: Reshaping Teaching and Learning. Arlington, VA: National Science Teachers Association Press. (This book was solicited from NSTA).

Curriculum Materials:

Krajcik, J. S., Palincsar, A._& Miller, E. (2015). Multiple Literacy in Project-Based Learning. Michigan State University, East Lansing MI; Lucas Education Research, a division of the George Lucas Educational Foundation, San Rafael, CA.

Interactions project (2016) a collaboration of Michigan State University, Concord Consortium, and University of Michigan. Funded by a grant from NSF (DRL# 1232388). Licensed under the Creative Commons Attribution 4.0 license. Received the first digital badge form Achieve for alignment to NGSS.

Krajcik, J., Reiser, B., Sutherland, L., and Fortus, D. (2012), IQWST: Investigating and questioning our world through science and technology, (Middle School Science Curriculum Materials). Activate Learning, USA.

PROFESSIONAL PRESENTATIONS (*Invited Talks of a Substantial Nature***):**

Keynote Presentation: Krajcik, J., Reflections on being a good mentor, Postgraduate School, Supervision Enrichment Winter School Programme, University of Johannesburg, South Africa, July 8 -12, 2019

Keynote presentation: Krajcik, J., Promoting Student Engagement and Creativity Thought through Project-Based Learning, Crossing-Border Human Capacity Building for Glocalized Scientific Literacy, Asia-Pacific Economic Cooperation, Taipei, Taiwan, May 22 - 24, 2019

Keynote presentation: Krajcik, J., Designing Science Education Learning Environments to Engage Students in Developing Useable, Jubilee Celebration Conference, Science Education Institute, Weizmann Institute of Science, Rehovot, Israel, January, 2019.

Keynote presentation: Krajcik, J., (2018). Designing Science Education Learning Environment to Engage Students in Developing Useable Knowledge. In the Launching Ceremony of the International Center for Science Education Research of Beijing Normal University NU &The International Science Education Forum of Beijing Normal University, Beijing, China, November 3-4, 2018.

Keynote presentations: Krajcik, J., Touitou, I., & Schneider, B. (2018), Crafting Engaging Science Environments, in Reforms in Science Teaching and Learning towards the 21st Century -- An International Conference Academic Arab College for Education in Haifa, Israel, December 11-13, 2018.

Keynote presentation: Krajcik, J.S. Promoting Student Engagement and Imagination through Project-Based Learning, OECD Centre for Educational Research and Innovation (CERI) International Conference, September 4-5, 2017, Durham, UK.

Keynote presentation: Krajcik, J.S. Promoting Student Engagement through Project-Based Learning Bill & Melinda Gates Foundation Convening on Teacher's Use of Curricula, January 11-13, 2018, Seattle, WA

RESEARCH PROJECTS (selected)

Collaborative Research: Building a Professional Learning Model to Support Middle School. Teachers in Envisioning and Promoting 3-Dimensional Science Learning. National Science Foundation. September 1, 2019 through August 31, 2023. $825,651.

Collaborative Research: Scaffolding Computational Thinking Through Multilevel Systems Modeling, NSF 1842037. Joseph Krajcik (PI). September 15, 2018 through August 31, 2022. $1,272,353.

Designing, Developing and Testing Rigorous Project-based Learning Materials to Support 5th Grade Learners in Science, English Language Arts and Mathematics Supplement. George Lucas Educational Foundation with a subcontract to the University of Michigan. February 1, 2017 through December 31, 2020. $600,000.

PIRE: Crafting Optimal Learning in Science Environments, NSF 1545684, Barbara L. Schneider, Joseph S. Krajcik. September 15, 2015 through August 31, 2020. $3,602,431.

Multiple Literacy in Project-Based Learning, Lucas Education Research, a division of the George Lucas Educational Foundation with a subcontract to the University of Michigan. January 1, 2015 through December 31, 2019. $5,417,441.

Exploring Potential Learning Trajectories for the Energy Concept in Middle School, National Science Foundation (DUE-143172) with subcontract to IPN, Germany and the Weizmann Institute of Science Israel. September 1, 2014 through August 31, 2018. $1,499,285.

Collaborative Research: Supporting Secondary Students in Building External Models, National Science Foundation, DRL-1417900, October 1, 2014 through July 31, 2019. $1,084,194.

Collaborative Research: Designing Assessments in Physical Science Across Three Dimensions, National Science Foundations, DRL-1316908, August 2013 through July 2016. $757,335.

Developing and Testing a Model to Support Student Understanding of the Sub-Microscopic Interactions that Govern Biological and Chemical Processes (National Science Foundation, DRL-1232388), Jospeh Krajcik (PI), September 1, 2012 through August 31, 2016, $2,104,855.

HONORS & CITATIONS (selected)

2019	Elected as a National Academy of Education Member.
2015	Invested as the Lappan-Phillips Professor of Science Education, College of Natural Science, MSU.
2014	George G. Mallinson Award from the Michigan Science Teachers Association for excellence of contributions to science education at the local, state and national level over a significant period of time.
2011	Recipient of the Provost Teaching Innovation Prize (IDEA Institute).
2010	Recipient of the Distinguished Contributions to Science Education Through Research Award from the National Association of Research in Science Teaching.
2010	Recipient of the University of Michigan Faculty Award for Distinguished Graduate Mentoring.
2009	Distinguished Professor, Ewha Womans University, Institute for Global Science, Society and Technology Education, Seoul, South Korea.
2009	Inducted as a Fellow of the American Educational Research Association.
2008	Inducted as a Fellow of the American Associate for the Advancement of Science.
2005	Weston Visiting Professor of Science Education, Weizmann Institute of Science, Rehovot, Israel (January – July 2005).
2003	Recipient of the Class of 1923 Teaching Award, School of Education, University of Michigan.

RICHARD M. LUECHT, PHD

BUSINESS
University of North Carolina at Greensboro
Educational Research Methodology
Rm. 240 School of Education Building
Greensboro, NC 27455-6170

HOME
[redacted]

Phone: (336) 404-0746 (cell)
E-mails: rmluecht@gmail.com, rmluecht@uncg.edu

AREAS OF EXPERTISE

- Design engineering/implementation of large-scale computer-based testing systems
- Assessment engineering and evidence-centered design
- Automated test assembly algorithms and systems integration
- Computer-adaptive testing and multistage testing, including multidimensional item response theory applications and multistage testing applications
- Scoring models for complex performance assessments
- Standard setting methods
- Item response theory estimation techniques and test score equating
- Graphics design and data visualization of quantitative data

EDUCATION

Ph.D. Degree, School of Education-Urban Education, University of Wisconsin, Milwaukee, WI, 1989. Major in Educational Psychology (Emphasis on Research, Measurement & Evaluation) and minor in Speech & Language Science. Dissertation title: *A Comparison of Applied Methods for Estimating Variance Components under Large, Random Effects Designs with Unbalanced Data.* M.S. Degree, University of Wisconsin, Milwaukee, WI, 1985. Major in Educational & Psychological Research, Measurement and Evaluation, B.S. Degree, Carroll College, Waukesha, WI, 1978. Major in Psychology and minor in Political Science

PROFESSIONAL EXPERIENCE

1999-present. ***Professor, Educational Research Methodology*** *(Tenured)*. University of North Carolina at Greensboro, **School of Education, Greensboro, North Carolina.** ***Director of the Center for Educational Research and Evaluation*** *at UNCG (1999-2005).* ***ERM Department Chair*** *(Fall 1999 to Spring 2002). Director of Graduate Studies (1999-2002, 2011-present)*

1994-1998. *Senior Psychometrician & Director, Computerized Adaptive Testing Research*, Psychometrics Division, National Board of Medical Examiners (NBME), Philadelphia, Pennsylvania.

1988-1994. *Instructor/Lecturer*. School of Allied Health Professions, University of Wisconsin—Milwaukee, Milwaukee, Wisconsin (through 1984). *Psychometrician I* and *Psychometrician II*. ACT, Inc. (formerly American College Testing), Iowa City, Iowa (1989-94)

PROFESSIONAL AFFILIATIONS & SERVICE

Awards: Samuel J. Messick Memorial Lecture Award given by Educational Testing Service TOEFL Program, 2001. Outstanding Reviewer for 2019 awarded by the American Educational Research Association and Journal of Educational and Behavioral Statistics (issued May 2020).

Active Memberships and Scholarly Service: Memberships include: American Educational Research Association; National Council on Measurement in Education;International Test Commission; Psychometric Society; Association of Computing Machinery; and Institute of Mathematical Statistics. Professional service software review editor for *Applied Psychological Measurement* (1998 to present), editorial board for the *Journal of Educational Measurement* (1994-2004; 2017-present), and journal reviewer for *Psychometrika*, *Applied Psychological Measurement*, *International Journal of Testing*, *Research Quarterly for Exercise and Sport*, *Journal of Educational Measurement*, *Measurement Issues & Practices*, *Journal of Educational and Behavioral Statistics*, *Applied Measurement in Education, Allied Health Sciences Education*, *Academic Medicine*, *Annals of Operations Research*, and *Psychometrika. Also a book reviewer for* Book reviewer for Taylor-Francis/Routledge; Kluwer, Sage Publications, Springer-Verlag New York, and Lawrence Erlbaum and Associates.

RESEARCH & SCHOLARSHIP ACTIVITIES

A. SOME KEY PUBLICATIONS (in chronological-first author order**)**

Luecht, R. M. (in press). Generating performance-level descriptors under a principled assessment design paradigm: An example for assessments under the Next-Generation Science Standards. *Educational Measurement: Issues and Practice*.

Luecht, R.; & Burke, M. (2020). Reconceptualizing items: From clones and automatic item generation to task model families. In In R. Lissitz & H. Jiao (Eds.), *Applications of artificial intelligence to assessment*, pp. 25-48. Baltimore, MD: Information Age Publishers.

Luecht, R. M. & Ackerman, T. A. (2018). A technical note on IRT simulation studies: Dealing with truth, estimates, observed data, and residuals. *Educational Measurement: Issues and Practice*, 37(3), pp. 65-76.

Luecht, R. M. (2017). Calibrating technology-enhanced items. In W. J. van der Linden (Ed.). *Handbook of item response theory, volume three: Applications*, pp. 86-193. New York: CRC Press.

Luecht, R. M. (2017). Professional certification and licensure examinations. In A. A. Rupp & J. P. Leighton (Eds.). *The handbook of cognition and assessment: Frameworks, methodologies, and applications*. pp. 446-471. New York: Wiley.

Luecht, R. M. (2017). Data and scale analysis for credentialing examinations. In S. Davis-Becker & C. W. Buckendahl (Eds.). *Testing in the professions*, pp. 123-152. New York: Routledge.

Luecht, R. M. (2016). Computer-based test delivery models, data, and operational implementation issues. In F. Drasgow (Ed.), *Technology and testing*, pp. 179-205. New York: Routledge.

Luecht, R. M. (2015). Applications of item response theory: Item and test information functions for designing and building mastery tests. In S. Lane, M. Raymond & T. Haladyna (Eds.). *Handbook of test development 2nd edition*, pp. 485-506. New York: Routledge.

Luecht, R. M. (2014). Computerized adaptive multistage design considerations and operational issues (pp. 69-83). In D. Yan, A. A. von Davier & C. Lewis (Eds.) *Computerized Multistage Testing: Theory and Applications*. London, UK: CRC Press/ Taylor & Francis Group.

Luecht, R. M. (2013). Assessment engineering task model maps, task models and templates as a new way to develop and implement test specifications. *Journal of Applied Testing Technology, 14* (www.testpublishers.org/journal-of-applied-testing-technology).

Luecht, R. M. (2012). Computer-Based and Computer-Adaptive Testing. In K. Ercikan, M. Simon & M. Rousseau (Eds.), *Improving Large Scale Assessment in Education: Theory, Issues, and Practice,* pp. 91-114,. New York: Taylor-Francis/Routledge.

Luecht, R. M. (2012). An Introduction to Assessment Engineering for Automatic Item Generation. In M. Gierl & T. Haladyna (Eds.), *Automatic item generation*, pp. 59-101. New York: Taylor-Francis/Routledge.

Luecht, R. M. (2012). Automatic item generation for computerized adaptive testing. In M. Gierl & T. Haladyna (Eds.), *Automatic item generation*, pp. 196-216. New York: Taylor-Francis/Routledge.

Luecht, R. M. (2012). Operational CBT Implementation Issues: Making It Happen. In R. Lissitz & H. Jiao (Eds.), *Computers and Their Impact on State Assessments: Recent History and Predictions for the Future*. Baltimore, MD: Information Age Publishers.

Luecht, R. M. & Sireci, S. G. (2011). *A Review of Models for Computer-Based Testing*. New York., NY: The College Board, Research Report, 2011-12.

Hendrickson, A; Huff, K.; & Luecht, R.M. (2010) Claims, evidence, and achievement-level descriptors as a foundation for item design and test specifications, *Applied Measurement in Education, 23(4)*, 358-377.

Zenisky, A.; Hambleton, R. J.; & Luecht, R. M. (2010). Multistage Testing: Issues, Designs, and Research. In W. J. van der Linden and C. E. W. Glas (Eds). *Elements of Adaptive Testing*, pp. 355-372. New York: Springer.

Luecht, R. M. (2007). Using information from multiple-choice distractors to enhance cognitive-diagnostic score reporting. In Jacqueline P. Leighton & Mark J. Gierl (Eds). *Cognitive diagnostic assessment for education: theory and applications, pp. 319-340*. London: Cambridge University Press.

Drasgow, F.; Luecht, R. M.; & Bennett, R. (2006). Technology and Testing. In R. L. Brennan (Ed.), *Educational Measurement, 4th Edition, pp. 471-515*. Washington, DC: American Council on Education/Praeger Publishers.

Luecht, R. M. (2006). Designing Tests for Pass/Fail Decisions Using IRT. In S. Downing & T. Haladyna (Eds.). *Handbook of Test Development* (pp. 575-596). Mahwah, NJ: Lawrence Erlbaum and Associates.

Luecht, R. M. (2006). Operational Issues in Computer-Based Testing. In D. Bartrum and R. Hambleton (Eds). *Computer-Based Testing and the Internet,* (pp. 91-114). West Sussex, England: John Wiley & Sons Ltd..

Luecht, R. M. (2005). Some Useful Cost-Benefit Criteria for Evaluating Computer-based Test Delivery Models and Systems. *Journal of Applied Testing Technology*.7(2), (www.testpublishers.org/journal.htm)

Luecht, R. M. (2005). Item Analysis. In B. Everitt & D. Howell (Eds), *Encyclopedia of Statistics in Behavioral Science*. West Sussex, UK: John Wiley & Sons, Ltd.

Luecht, R. M. (2005). Computer-Adaptive Testing. In B. Everitt & D. Howell (Eds), *Encyclopedia of Statistics in Behavioral Science*. West Sussex, UK: John Wiley & Sons, Ltd.

Luecht, R. M. (2005). Computer-Based Testing. *Encyclopedia of Social Measurement, Volume 1*. Elsevier, Inc, 419-427.

Luecht, R. M. (2003). Multistage complexity in language proficiency assessment: A framework for aligning theoretical perspectives, test development, and psychometrics. *Foreign Language Annals*, 36(4), 518-526.

Luecht, R. M. & Clauser, B. (2002). Test models for complex computer-based testing. In C. Mills, M. Potenza, J. Fremer, and W. Ward (Eds.) *Computer-based Testing: Building the Foundation for Future Assessments*, pp. 67-88. Mahwah, NJ: Erlbaum.

Luecht, R. M. & Nungester, R. J. (2000). Computer-adaptive sequential testing. In C. Glas & W. J. van der Linden (Eds). *Computer-Adaptive Testing*, pp. 117-128. Dordrecht, The Netherlands: Kluwer Academic Publishers.

Luecht, R. M. (1999). The practical utility of Rasch measurement models. In M. Chalhoub-Deville (Ed.) *Studies in Language Testing: Issues in Computer-Adaptive Testing of Reading Proficiency* (pp. 192-211). New York: Cambridge University Press.

Luecht, R. M. (1998). Computer-assisted test assembly using optimization heuristics. *Applied Psychological Measurement, 22*, 224-336.

Luecht, R. M. & Nungester, R. J. (1998). Some practical applications of computerized adaptive sequential testing. *Journal of Educational Measurement*, 35, 229-249.

van der Linden, W. J. & Luecht, R. M. (1998). Observed-score equating as a test assembly problem. *Psychometrika*, *63*, 401-418.

Luecht, R. M., DeChamplain, A., Nungester, R. J. (1997). Maintaining content validity in computerized adaptive testing. *Advances in Health Sciences Education*, 3, 29-41.

Luecht, R. M. (1996). Multidimensional computerized adaptive testing in a certification or licensure context. *Applied Psychological Measurement, 20*, 389-404.

van der Linden, W. J. & Luecht, R. M. (1996). An optimization model for test assembly to match observed score distributions. In G. Englehard & M. Wilson (Eds.). *Objective Measurement: Theory into Practice (Volume 3)*. Norwood, NJ: Ablex.

B. SOME RECENT CONFERENCE PAPERS & PRESENTATIONS (in chronological-alphabetical order**)**

Luecht, R. M. (2020). No more items: On the principled design of task-model families. Paper presented at the Annual Meeting of the National Council on Measurement in Education (online, 15-June 2020).

Luecht, R. M.; Patton, E. A.; & Lay, A. (2019, April). *Modeling of multilevel item structures: A comparison of item response theory calibration strategies*. Paper/electronic board presentation at the Annual Meeting of the National Council on Measurement in Education.

Luecht, R. M. (2018, April*). Promises and challenges with computerized-adaptive testing in K-12 assessments*. Coordinated presentation at the Annual Meeting of the National Council on Measurement in Education, New York, NY.

Luecht, R. M. & Ackerman, T. A. (2017, September). *Some graphical techniques for presenting aberrant response and timing data analysis results.* Paper presented at the Conference on Test Security. Madison, WI.

Luecht, R. M. (2017, March). *IRT modeling: Creating useful and thoughtful calibration strategies*. Paper presented at the Annual Conference of the Association of Test Publishers. Scottsdale, AZ,

Luecht, R. M. (2016, July). *Engineering design in the assessment world: A new paradigm for test design and development, with psychometric implications*. Invited paper presented at the International Meeting of the Psychometric Society, Asheville, NC.

Luecht, R. M. (2015, September). *Design and implementation of a large-scale 1-3-4 computerized adaptive multistage testing system for reading and listening*. Paper presented at the International Association of Computerized Adaptive Testing, Cambridge University, Cambridge, U.K.

Luecht, R. M. (2013, October). *Evidence-based design and assessment engineering principles: The future of educational assessment*. Invited **keynote address** at the International Association of Educational Assessment, Tel Aviv, Israel.

Luecht, R. M. (2012, July). *Engineering the Design of Assessment Task Models and Templates*. Invited **keynote address** at the International Test Commission Annual Meeting, Amsterdam, The Netherlands.

Luecht, R. M. (2012, March). *Assessment design and development, version 2.0: From art to engineering*. Invited closing **keynote address** at the Association of Test Publishers Conference, Phoenix, AZ.

M. Christina Schneider, Ph.D.

Professional Experience

NWEA. Portland OR: 2016 – Present

Senior Director, Psychometrics and Learning Science. I lead three geographically dispersed teams dedicated to assessment design & learning science, psychometrics, and project management. The team has conducted design and development of assessments in English language arts, mathematics, and science fixed form and computer adaptive assessments.

I am the developer of an assessment design and development process that focuses on the use of learning science and teacher expertise as an underpinning, and as such, creates learning progressions within and across grades to support instructional actions. I architected and led the principled assessment design and development-process used to build the *Georgia Kindergarten Inventory of Developing Skills*, a formative and summative assessment system to inform instruction in English language arts and mathematics. For the state of Nebraska, I have architected the development of progressions and associated task development process to those progressions, the collection of validity evidence, and we are now focused on supporting teachers in implementing these tools within their local curriculum and instruction to support more personalized approaches to learning.

National Center for the Improvement of Educational Assessment, Inc. Dover NH: 2014–2016

Senior Associate. I lent technical expertise to national assessment consortiums, states, districts, and schools. I used my skills in understanding student learning in different content areas, psychometrics, hand scoring, and policy issues as well as my research in formative assessment, automated essay scoring, standard setting, and test accommodations to support clients.

I was a consultant for state departments of education (Georgia, Utah, Florida; South Carolina) and school districts (Hillsborough County Public Schools, Florida; Dorchester County School District 2, SC; Aiken County Public Schools, SC) architecting processes for their assessments to help teachers better understand what proficiency means and linking large scale interpretations to classroom-based formative assessment actions. I authored a 40-hour professional development course for teachers on Student Learning Objectives that was recorded by South Carolina Educational television, and I updated and recorded a 40-hour professional development course in high quality formative classroom assessment practices. Notably, the test score interpretation framework I co-authored has now been incorporated into 40% of large-scale assessments nationwide that states use in their accountability systems.

CTB/McGraw-Hill. Monterey CA: 2006–2013

Research Manager. I managed and provided psychometric leadership to a team of research scientists (Ph.D's), research associates, and standard setting specialists who worked primarily on custom contracts. I led the evaluation and deployment of Automated Essay Scoring engines for formative and high-stakes projects and described a score report using formative feedback.

Research Scientist: I led the psychometric work on multiple custom contracts that used item response theory scaling and equating and consulted with senior State Department of Education staff across multiple customer contracts to ensure testing programs psychometrically met policy needs. I designed and conducted peer review approved standard settings and achievement level descriptor workshops for multiple statewide assessments. I co-authored the innovative framework for achievement level descriptors (ALDs) used by the Smarter Balanced Assessment Consortium and other states as they developed Common-Core-State-Standards-aligned ALDs to meet multiple purposes. I also developed a formative and classroom assessment professional development curriculum for the state of South Carolina,

I facilitated the processes states use to establish proficiency for multiple statewide assessments in working with teachers and content experts in reading, mathematics, science, social studies, and English language proficiency as well as wrote proposals for many RFPs.

South Carolina Department of Education. Columbia, SC: 2002–2006

Psychometric and Data Analysis Group Coordinator: I managed the psychometric and data analysis personnel within the Office of Assessment, monitored contractor technical work and technical reports for the South Carolina statewide testing program, and directed, co-designed, and produced reports for in-house research studies. I facilitated the development of score interpretations for English language arts, mathematics, and science for the Palmetto Achievement Challenge Tests.

National Assessment of Educational Progress (NAEP) Coordinator: I monitored hand scoring of constructed response items by contractors. I designed and implemented assessment-related professional development for South Carolina public school teachers (e.g., performance task creation, rubric development, standardized test interpretation, and item and test statistic use and interpretation), and produced "Assessment Informational Overview", an instructional television program in South Carolina designed to update public school teachers and administrators about the large scale assessments in South Carolina. I produced and co-authored *Assessing Standards in the Classroom*, an instructional television series and companion document in South Carolina designed to provide professional development to public school teachers and administrators about creating standards-based, classroom assessments. I wrote and was awarded a $1.7 million dollar grant to investigate the efficacy of the professional development curriculum on teacher and student achievement. I also coordinated the administration of NAEP in South Carolina.

Education

Ph.D. Music Education, 2004	University of South Carolina, Columbia, SC
M.Ed. Educational Research, 2005	University of South Carolina, Columbia, SC
M.ME. Music Education, 1997	University of South Carolina, Columbia, SC
B.M. in Music Education, 1993	University of South Carolina, Columbia, SC

Pragmatic Marketing	
Foundations, 2019	Portland, Oregon
Focus, 2019	Portland, Oregon
Build, 2020	Atlanta, Ga

Selected Publications and Presentations

Publications

Huff. K., Nichols, P., & Schneider. M.C. (under contract). Designing and developing educational assessments. In L. Cook & M. Pitoniak (Eds.), *Educational Measurement: 5th Edition.* NCME

Schneider, M.C. & Boyer M. (2019). Quality assurance for automated scoring systems. In A. Rupp, D. Yan, & P. Foltz (Eds.), *Handbook of automated scoring: Theory into practice*. Chapman & Hall/CRC.

Schneider, M.C., Egan, K.L., & Gong, B. (2017), Defining and challenging fairness in tests involving students with dyslexia: Key opportunities in test design and score interpretations. In H. Jiao & R. W. Lissitz (Eds.) *Test fairness in a new generation of large scale assessments.* Information Age Publishing. 209-229.

Schneider, M.C., & Andrade, H. (2013). Teachers' and administrators' use of evidence of student learning to take action. *Applied Measurement in Education, 26*(3). 159–162.

Schneider, M.C., & Gowan, P. (2013). Investigating teachers' skills in interpreting evidence of student learning. *Applied Measurement in Education, 26*(3). 191–204.

Schneider, M.C., Huff, K.L., Egan, K.L, Gaines, M.L., & Ferrara, S. (2013). Relationships among item cognitive complexity, contextual response demands, and item difficulty: Implications for achievement level descriptors. *Educational Assessment, 18(*2). 99–121.

Schneider, M. C., Egan, K.L., & Julian, M.W. (2013). Classroom assessment in the context of high stakes assessment. In J. McMillian (Ed.) *Handbook of Research in Classroom Assessment.*

Los Angeles: Sage. 55–70.

Schneider, M.C. & Meyer, J.P. (2012). Investigating the efficacy of a professional development program in formative classroom assessment in middle school English language arts and mathematics. *Journal of Multidisciplinary Evaluation, 8*(17). 1–24.

Egan, K.L., Schneider, M.C., & Ferrara, S. (2012). Performance level descriptors: History, practice and a proposed framework. In G. Cizek (Ed.), *Setting performance standards: Foundations, methods, and innovations* (2nd ed., pp. 79–106). New York: Routledge.

Egan, K. L., Schneider, M.C., & Ferrara, S. (2011). The 6D Framework: A validity framework for defining proficient performance and setting cut scores for accessible tests. In S. Elliott, R. Kettler, P. Beddow, & A. Kurz (Eds.), *Accessible Tests of Student Achievement: Issues, Innovations, and Applications*. New York: Springer. 275–292.

Schneider, M.C., & Randel, B. (2010). Research on characteristics of effective professional development programs for enhancing educators' skills in formative assessment. In H. Andrade & G. Cizek (Eds.)*, Handbook of Formative Assessment.* New York: Routledge. 251–276.

Kim, D.H., Schneider, C., & Siskind, T. (2009). Examining the underlying factor structure of the statewide secondary level science test under regular and oral administrations. *Journal of Psychoeducational Assessment, 27*(4). 323–333.

Egan, K. L., Ferrara, S., Schneider, M. C., & Barton, K. E. (2009). Writing performance level descriptors and setting performance standards for assessments of modified achievement standards: The role of innovation and importance of following conventional practice. *Peabody Journal of Education*, *84* (1). 552–557.

Kim, D.H., Schneider, C., & Siskind, T. (2009). Examining equivalence of accommodations on a statewide elementary-level science test. *Applied Measurement in Education. 22*(2), 144–163.

Schneider, M.C. (2008). An investigation and identification of a construct of music experience. *Bulletin of the Council for Research in Music Education, 176.* pp. 63–73.

Huynh, H., & Schneider, M.C. (2005). Vertically moderated standards: Background, assumptions, and practices. *Applied Measurement in Education, 18* (1)*,* 99–115.

Edited Refereed Journal Issue

Schneider, C., & Andrade, H. (Eds.) (2013). Teachers' and administrators' use of evidence of student learning to take action. *Applied Measurement in Education, 26*(3).

Book

Schneider, M.C. & Johnson, R.L. (2019). *Using learning trajectory-based formative assessments to support student learning and SLOs.* Taylor and Francis.

Selected Presentations

Schneider, M.C., & Veazey, M., (2020, April). *Examining alignment of test score interpretations on a computer adaptive assessment.* Presentation to be presented at the annual meeting of the National Council on Measurement in Education in San Francisco, Ca. in the coordinated session *Alignment Frameworks for Complex Assessments: Score Interpretations Matter*. Schneider, M.C. Organizer.

Needham, C., & Schneider, M. C., (2020, April), *PAD or not to PAD: Let the market decide.* Presentation to be presented at the annual meeting of the National Council on Measurement in Education in San Francisco, Ca. in the coordinated session *What is the Value Proposition for Principled Assessment Design?* Nichols, P. Organizer.

Lee, J., Schneider, M.C., Scheuring, S., Im, S. & Kim, J. (2019, June). *Running simulations to maintain score compatibility of CATs across years*. Presentation at the annual meeting of the International Association for Computerized Adaptive Testing. Minneapolis, Minnesota.

Schneider, M.C. (2017, September). *A theory of action regarding the intended use and purpose of a progression-based formative assessment system: GKIDs-revision*. Presentation presented at the annual meeting of the National Council on Measurement in Education Special Conference on Classroom Assessment, Lawrence, KS.

Schneider, M.C. (2017, April). *Using principled assessment design to support formative assessment and students opportunities to learn.* Paper presented at the annual meeting of the National Council on Measurement in Education, San Antonio, TX.

Schneider, M.C. & Ferrara. S. (2017, April), *Conceptual frameworks for aligning items to ALDs to enhance validity arguments.* Training Session presented at the annual meeting of the National Council on Measurement in Education, San Antonio, TX

Jill Wertheim
Director of Science Assessment, Stanford Center for Assessment, Learning, and Equity
Stanford University
51 Cubberly Hall
485 Lasuen Mall, Stanford, CA 94305
617-335-8893
jwerthei@stanford.edu

Professional Preparation

Middlebury College	Middlebury, VT	Geology	B.A. 1997
UC Santa Barbara	Santa Barbara, CA	Geological Sciences	PhD 2001

Appointments

Director of Science Assessment, Stanford Center for Assessment, Learning, and Equity 2019-Present
Technical Lead, State Performance Assessment Learning Community 2018-Present
Principal Researcher, Stanford NGSS Assessment Project 2015-2019
Assessment Developer, Biological Sciences Curriculum Study (BSCS) 2017-2019
Research Scientist, National Geographic Society 2011-2015
Research Associate, AAAS Project 2061 2007-2001
Instructor, UC Santa Barbara Dept of Geosciences 2006-2007
Research Assistant, National Center for Ecological Analysis and Synthesis 2002-2007
Teaching Assistant, UC Santa Barbara Dept of Geosciences 2001-2007
Assistant Curator, Museum of Science, Boston 1997-2001

Selected Publications/Presentations

Wertheim, J. & Osborne, J. (2019). Supporting Coherence Across a System of Assessment for NGSS. *In American Educational Research Association (AERA) Annual International Conference.*

Badrinayran, A. & Wertheim, J. (2019). Reconceptualizing Alignment for NGSS Assessments. *In National Association for Research in Science Teaching (NARST) Annual International Conference*.

Wertheim, J. (2018). Assessment Design Principles for Supporting All Learners with NGSS. *Presentation by invitation for the Annual Meeting of the Council of State Science Supervisors.*

Wertheim, J. A., Holthuis, N.H., Schultz, S.E. (2016). *Evaluating Item Quality in Large-Scale Assessments: Phase I Report of the Study of State Assessment Systems.* Palo Alto, CA: Stanford Center for Assessment, Learning, and Equity.

Wertheim, J. A., Osborne, J., Quinn, H., Pecheone, R., Holthuis, N., Schultz, S. E., & Martin, P. (2016). *An Analysis of Existing Science Assessments and the Implications for Developing Assessment Tasks for the NGSS*. Palo Alto, CA: Stanford Center for Assessment, Learning, and Equity.

Wertheim, J. (2016). Taking Stock: Implications of a New Vision of Science Learning for State Science Assessment. *Measurement: Interdisciplinary Research and Perspectives*, *14*(4), 158–161.

Osborne, J., Pecheone, R., Quinn, H., Holthuis, N., Schultz, S., Wertheim, J. A., & Martin, P. (2015). *A system of assessments for NGSS science in California: A discussion document*. Palo Alto, CA: Stanford Center for Assessment, Learning, and Equity.

Edelson, D. C., Shavelson, R. J., & Wertheim, J. A. (2013). *A road map for 21st century geography education: Assessment (A report from the Assessment Committee of the Road Map for 21st Century Geography Education Project).* Washington, DC: National Geographic Society.

Products

"Developing Performance Assessments for the NGSS Classroom". Hybrid online Course offered on edX. June, 2020.

"Performance Assessment for the NGSS Classroom: Implications for Practice." Hybrid online Course on edX. March, 2020. Hybrid online Course offered on edX.

"Performance Assessments." *Stanford NGSS Assessment Project*, Dec., 2018, snapgse.stanford.edu/.

"Design Toolkit for developing 3-dimensional Performance Assessments." *Stanford NGSS Assessment Project*, Sept, 2019, snapgse.stanford.edu/.

"Toolkit for Using Performance Assessments to Inform Instructional Decisions." *Stanford NGSS Assessment Project*, Dec., 2018, snapgse.stanford.edu/.

"Science Assessments" *AAAS Project 2061*, 2011. http://assessment.aaas.org/.

Synergistic Activities

- Advisor/Expert Reviewer for IES Grant: "Assessing Students' Progress on the Energy Concept Using Three-Dimensional Items" (2017-present)
- Advisor to IMLS grant: "Augmenting Museum Visits: Guiding Families to Share in the Learning" (2018-present)
- Advisor to Enhanced Assessment Grant (Dept of Education): Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (2018-Present)
- Advisor to NSF Grant "Collaborative Research: Extending and Investigating the Impact of the High School Model-Based Educational Resource (MBER)" (2018-present)
- Advisor to the Council of Chief State Superintendents (CCSSO) Science SCASS (2018-2019)
- Leadership Committee Member for Achieve, Inc Project: Criteria for Procuring and Evaluating High-Quality Summative Assessments Aligned to the Next Generation Science Standards (2018-2019)
- Expert reviewer for NSF Grant "Examining an Innovative Approach to Supporting Science Teachers Practice towards Three-Dimensional Learning Goals through Adapting Classroom Assessment Tasks" (2017-2018).
- Invited reviewer for the Next Generation Science Standards (on behalf of NSTA) (2012)
- Ad Hoc Reviewer for the National Science Foundation (2017-2020)

References

Ackerman, T.A., Gierl, M.J., & Walker, C.M. (Fall, 2003). An NCME Instructional Module on using multidimensional item response theory to evaluate educational and psychological tests. *Educational Measurement: Issues and Practice*, *22*(3).

Ackerman, T.A. (1992). A didactic explanation of item bias, item impact, and item validity from a multidimensional perspective. *Journal of Educational Measurement, 29*(1), 67-91.

Allen, R. H. (2002). *Impact teaching: Ideas and strategies for teachers to maximize student learning*. Boston, MA: Allyn and Bacon.

Alozie, N., Haugabook Pennock, P., Madden, K., Zaidi, S., Harris, C. J., & Krajcik, J. S. (2018, March). *Designing and developing NGSS-aligned formative Assessment tasks to promote equity.* Paper presented at the annual conference of National Association for Research in Science Teaching, Atlanta, GA.

Briggs, D.C. & Wilson, M. (2003). An introduction to multidimensional measurement using Rasch models. *Journal of Applied Measurement*, *4*(1), 87-100.

Crocker, L. & Algina, J. (2006). *Introduction to Classical and Modern Test Theory*. NY: Wadsworth Publishers.

DeBarger, A. H., Penuel, W. R., Harris, C. J. & Kennedy, C. A. (2015). Building an assessment argument to design and use next generation science assessments in efficacy studies of curriculum interventions. *American Journal of Evaluation, 37*(2). DOI: 10.1177/1098214015581707

Dede, C., Ketelhut, D. J., Whitehouse, P., Breit, L, & McCloskey, E. M. (2009). A research agenda for online teacher professional development. *Journal of Teacher Education, 60*(1), 8-19. DOI: 10.1177/0022487108327554

Dillman, D. (1999). *Mail and Internet Surveys: The Tailored Design Method* (2nd ed.). New York: John Wiley and Sons.

Ferrara, S., Lai, E., Reilly, A., & Nichols, P. (2016). Principled approaches to assessment design, development, and implementation. In Jacqueline P. Leighton & Andre A. Rupp (Eds.), *Handbook of Cognition and Assessment*, 41-74. Wiley.

Fischer, K. W., Rotenberg, E. J., Bullock, D. H., & Raya, P. (1993). The dynamics of competence: How context contributes directly to skill. In R. H. Wozniak & K. W. Fischer (Eds)., *Development in context: Acting and thinking in specific environments*, (pp. 93-117). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Forte, E. (2017). Evaluating alignment in large-scale standards-based assessment systems. Alexandria, VA: edCount, LLC.

Fowler, F. (2002). *Survey Research Methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Gane, B. D., McElhaney, K. W., Zaidi, S. Z., & Pellegrino, J. W. (2018, March). *Analysis of student and item performance on three-dimensional constructed response assessment tasks*. Paper presented at the 2018 NARST Annual International Conference, Atlanta, GA.

Grob, G.F. (2006). The Evaluator's Role in Policy Development. New Directions for Evaluation. 112: 99-108. Improving America's Schools Act of 1994, Pub. L. No. 103-382.

Harris, C., Krajcik, J., Pellegrino, J. W., & DeBarger, A. (2019). Designing knowledge in use assessments to pronote deeper learning. *Educational Measurement: Issues and Practice, Summer 2019, 38*(2), 53-67.

Krajcik, J., McNeill, K. L., & Reiser, B. J. (2008). Learning-goals-driven design model: Developing curriculum materials that align with national standards and incorporate project-based pedagogy. Science Education, 92(1), 1-32. DOI: 10.1002/sce.20240

Krueger, R. & Casey M.A. (2000). Focus Groups: *A Practical Guide for Applied Research (*3rd ed.). Sage Publishing, Thousand Oaks, CA.

Lai, E. R., Kobrin, J., Nichols, P., & Holland, L. (2015, April). Developing and evaluating learning progression-based assessments in mathematics. In Annual Meeting of the American Educational Research Association, Chicago, IL.

Lai, E. R., Kobrin, J. L., DiCerbo, K. E., & Holland, L. R. (2017). Tracing the assessment triangle with learning progression-aligned assessments in mathematics. Measurement: Interdisciplinary Research and Perspectives, 15(3-4), 143-162.

Lewis, D. & Cook, R. (2020). Embedded Standard Setting: Aligning standard setting methodology with contemporary assessment design principles. *Educational Measurement: Issues and Practice, 39*(1), 8-21.

McElhaney, K.W., Zaidi, S., Gane, B. D., Alozie, N., & Harris, C.J. (2018, March). *Designing NGSS-aligned assessment tasks and rubrics to support classroom-based formative assessment*. Paper presented at the NARST Annual International Conference, Atlanta, GA.

McLaughlin, J. (2001). Proposal to National Science Foundation. Macgroup Consulting, Williamsburg, VA.

McTighe, J. & Wiggins, G. (1998). *Understanding by Design*. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

Mislevy, R. J., & Haertel, G. D. (2006). Implications of evidence-centered design for educational testing. *Educational Measurement: Issues and Practice*, 25(4), 6–20.

Mooney, N. J. & Mausbach, A. T. (2008). *Align the design*. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

National Research Council (NRC). (2014). *Developing Assessments for the Next Generation Science Standards*. Washington, DC: The National Academies Press. https://doi.org/10.17226/18409.

National Research Council (NRC) (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press. https://doi.org/10.17226/13165.

National Research Council (NRC). (2007). *Taking science to school: Learning and teaching science in grades K-8*. Washington, DC: The National Academies Press. https://doi.org/10.17226/11625.

Nichols, P. D., Kobrin, J. L., Lai, E., Koepfler, J. D. (2017). The role of theories of learning and cognition in assessment design and development. A. A. Rupp & J. P. Leighton (Eds.) *The Handbook of Cognition and Assessment: Frameworks, Methodologies, an Applications, First Edition*, pp. 41-74. New York: Wiley Blackwell.

Nichols, P. D., Ferrara, S., & Lai, E. (2015). Principled design for efficacy: Design and development for the next generation of assessments. In R. Lissitz & H. Jiao (Eds.), The next generation of testing: Common core standards, smarter balanced, PARCC, and the nationwide testing movement (pp. 49-81). Baltimore: Information Age Publishing.

Pellegrino, J. W., Chudowsky, N., & Glaser, R. (2001). *Knowing what students know: The science and design of educational assessment*. Washington, DC: National Academy Press.

Perkins, D. (1998). Do students understand understanding? *The Education Digest, 59*(5).

Perry, R., Thomas, B., DuBois, E., & McGowan, B. (2006). A Utilization-Focused Approach to Evaluation by a Performance Audit Agency. New Directions for Evaluation. 112: 67-78.

Reckase, M.D. (2009). *Multidimensional item response theory*. New York, NY: Springer.

Schlager, M. S. & Fusco, J. (2004). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? *The Information Society, 19*(3), 203-220. DOI: 10.1080/01972240309464

SCILLSS. (2017a). *Project Information*. Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores. https://www.scillsspartners.org/

SCILLSS. (2017b). *What are SCILLSS' goals?* Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores. https://www.scillsspartners.org/what-are-scillss-purposes-and-goals/

SCILLSS. (2017c). *SCILLSS Resources.* Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores. https://www.scillsspartners.org/scillss-resources/

Unger, C., Lane, B., Cutler, E., Lee, S., Whitney, J., Arruda, E., & Silva, M. (2008). *How Can State Education Agencies Support District Improvement?* A Conversation Amongst Educational Leaders, Researchers, and Policy Actors. Providence, RI: The Education Alliance at Brown University.

Walker, C. M. & Beretvas, S. N. (2006). An empirical investigation demonstrating the multidimensional DIF paradigm: A cognitive explanation for DIF. *Journal of Educational Measurement, 38*(2), 147-163.

WBEC. (2000). *The power of the internet for learning: Moving from promise to practice*. Washington, DC: Web-based Education Commission.

Zaidi, S. Z., Ko, M., Gane, B.D., Madden, K., Gaur, D., & Pellegrino. J.W. (2018, March). *Portraits of teachers using three-dimensional assessment tasks to inform instruction*. Paper presented at the NARST Annual International Conference, Atlanta, GA.

Zheng, Y. & Fischer, K. W. (2002). The development of dynamic skill theory. In D. J. Lewkoqicz & R. Lickliter (Eds.), Conceptions of development: Lessons from the laboratory. New York, NY: Psychology Press.

Budget Narrative File(s)

* **Mandatory Budget Narrative Filename:** 1237-SIPS Budget Narrative.pdf

Add Mandatory Budget Narrative | Delete Mandatory Budget Narrative | View Mandatory Budget Narrative

To add more Budget Narrative attachments, please use the attachment buttons below.

Add Optional Budget Narrative | Delete Optional Budget Narrative | View Optional Budget Narrative

SIPS Project Budget Proposal

The state of Nebraska's Department of Education (NDE) submits the enclosed cost proposal as a part of the response to the Request for Proposals (RFP) under the Competitive Grants for State Assessments Program, CFDA 84.368A.

Below, we describe the nature and amount of costs necessary to accomplish the tasks for the collaborative project ***Stackable, Instructionally-embedded, Portable Science (SIPS) Assessments***. SIPS is designed to engage eight participating states in the project work and produce resources for use by all states by:

- establishing a bank of instructionally-embedded science assessment tasks aligned with an actionable performance scale;
- building state and local educators' capacity to offer high quality science instruction, evaluate students' learning, and make appropriate instructional decisions; and
- engaging educators, students, and parents in a partnership for student success across a range of circumstances.

The tasks and activities necessary to achieve these goals are described in detail in the narrative of the technical proposal.

For each cost type in the budget, we have outlined the assumptions used in arriving at our estimates. The narrative associated with the full development is based on an anticipated start date of October 1, 2020 and continuing through September 30, 2023, for a total of 36 months. This cost proposal is responsive to the U.S. Department of Education's (ED) notice inviting applicants and reflects our team's best effort to achieve the services and deliverables for this RFP, while at the same time remaining competitive in the market. The proposal includes reasonable assumptions about certain RFP requirements. The NDE and project partners trust that

the assumptions included in the technical and cost proposals help explain the merit of its proposal. While NDE does not believe that any of the assumptions included in its proposal are contrary to the RFP requirements or instructions, NDE confirms that if any such assumptions are deemed to contradict the RFP, the terms, conditions, and requirements of the RFP shall supersede such assumptions.

Below the cost justification for each category, we provide total costs by cost type in list form for each year of the proposed project. We will gladly provide greater detail for, or clarification of, the figures presented in this cost proposal if requested by the proposal evaluation team. NDE requests a grant in the amount of **$2,999,877.50** for the SIPS project.

Personnel

This line includes costs for NDE personnel required to manage the project. The costs are inclusive of total labor costs for the grant manager committed to the SIPS project.

Personnel: Assigned project staff	**% FTE**	**Year 1**	**Year 2**	**Year 3**	**Total**
Grant Manager	1.0	$68,000	$70,000	$72,000	$210,000

Fringe Benefits

Fringe benefits for the grant manager are included at an established agency rate of 46%.

Travel

The costs in this line item include all travel costs for the project. This includes travel to conferences for the purposes of dissemination of findings and resources to the field. Costs

associated are inclusive of airfare, ground transportation, lodging, meals, and incidentals for the entire SIPS project team (edCount, LSRI, the Center for Assessment, SRI International, Creative Measurement Solutions, and Garrett Consulting, state leads and educators from all participating states). All travel will be coordinated by edCount and will be included in their contract. All other specific project-related meetings (outside of in-person conference presentations) will be virtual for cost-savings purposes and to accommodate the restrictions related to the Covid-19 pandemic.

Equipment

This line includes a one-time cost of $25,000 for office equipment and rent for the NDE grant manager during Year 1 of the project.

Supplies

No charges are included in this line.

Contractual

This line includes all labor costs for project implementation for the contractor we have secured for this project (edCount, LLC) as well as edCount's sub-contractors (Learning Sciences Research Institute, the Center for Assessment, SRI International, Creative Measurement Solutions, and Garrett Consulting). It also includes labor for members of the Technical Advisory Panel (TAP) and development of the SIPS website. Labor costs have been included for the following tasks as reflected in our proposal:

- **Project Management** – edCount labor costs to manage subcontractors, plan and manage all biweekly and annual meetings, facilitate conference calls, facilitate development of the project Theory of Action, and distribute project documentation. This also includes website design, hosting, and maintenance for the duration of the project and five years after the project concludes.

- **Claims, Measurement Targets, PLDs, and Curricular Planning Tools and Templates –** labor associated with the development of claims, measurement targets, and PLDs; support selection of NGSS bundles, development of student profiles and progressions; development of curricular alignment tools, unit templates, and assessment templates.
- **Prototype Curriculum Framework (curricular units and trainings) –** labor for the development and facilitation of UbD, UDL/accessibility, PAD and NGSS trainings; draft UbD Curricular Units for NGSS model bundles; facilitate internal and external reviews with expert advisors and participating educators; revise and refine curricular units and assessments; support process documentation.
- **Classroom Assessment Development Workshops –** labor associated with the facilitation of virtual workshops with state and local educators to develop classroom assessment tasks; evaluate and provide task feedback to educators using the NGSS Task Screener; facilitate virtual sessions with educators, and finalization of design tools, tasks, rubrics and exemplar responses for wider dissemination.
- **Pilot Study of Curriculum Prototypes and Common Assessments –** labor associated with the development of pilot study process, criteria and protocol; the recruitment of educators from across partner states; the design of the study and develop sampling methods; the analysis and summary of pilot study results and educator vignettes, the refinement and finalization of curricular units based on educator feedback.
- **Project Evaluation** – the labor costs associated with the design and development of the project evaluation and dissemination plan (e.g., disseminating info about systemization, measurement model, flexibility of state implementation) as well as all costs related to development of quarterly, annual, and culminating reports.

All labor costs are based on a Commercial Price List, derived from edCount's federally-approved Mission Oriented Business Integrated Services (MOBIS) labor rates and applying no loads to the five subcontracts. edCount, LLC is a federally-recognized woman-owned small business as part of the US Small Business Administration Women Owned Small Business (WOSB) Program. edCount has also been granted a National Women's Business Enterprise Certification (WBE) by the National Women's Business Enterprise Council (WBENC).

We anticipate awarding edCount a fixed-price contract to include their contract amount for labor as well as the budget amount for both travel for all project partners and stipends for all educators involved in the classroom assessment development workshops and the pilot study of curriculum prototypes and common assessments. edCount will award fixed-price subcontracts to each of the five subcontractors. The roles and time commitments for key staff from each of the contractors are shown in the table below.

Total Project Personnel FTE for Contractual Staff

Staff	Organization	Role	Phase/Task	FTE/Year
Ellen Forte	edCount, LLC	Co-principal Investigator	1, 2, 3, 4, 5, 6	1%
Jim Pellegrino	Learning Sciences Research Institute	Co-principal Investigator	1, 2, 3, 4, 5	15%
Erin Buchanan	edCount, LLC	Project Director	1, 2, 3, 4, 5, 6	9%
Antoinette Melvin	edCount, LLC	Deputy Project Director	1, 2, 3, 4, 5, 6	8%
Dan Lewis	Creative Measurement Solutions	Lead Psychometrician	2, 3, 5, 6	7%
Scott Marion	Center for Assessment	Measurement Specialist	1, 2, 3, 4, 5, 6	3%
Nathan Dadey	Center for Assessment	Measurement Specialist	1, 2, 3, 4, 5, 6	10%
Howard Everson	SRI International	Principled Design Specialist	1, 2, 3, 4, 5, 6	10%

Staff	Organization	Role	Phase/Task	FTE/Year
Daisy Rutstein	SRI International	Principled Design Specialist	1, 2, 3, 4, 5, 6	10%
Donald Wink	Learning Sciences Research Institute	Curriculum and Assessment Design Specialist	1, 2, 3, 4, 5, 6	8%
Brian Gane	Learning Sciences Research Institute	Curriculum and Assessment Design Specialist	1, 2, 3, 4, 5, 6	27%
Sania Zaidi	Learning Sciences Research Institute	Curriculum and Assessment Design Specialist	1, 2, 3, 4, 5, 6	27%
Monica Ko	Learning Sciences Research Institute	Curriculum and Assessment Design Specialist	1, 2, 3, 4, 5, 6	27%
TBD	Learning Sciences Research Institute	Project Coordinator	1, 2, 3, 4, 5, 6	50%

Staff	Organization	Role	Phase/Task	FTE/Year
Bill Herrera	edCount, LLC	Science Content and Assessment Specialist	2, 3, 4, 5, 6	10%
Charlene Turner	edCount, LLC	Science Content and Assessment Specialist	2, 3, 4, 5, 6	10%
Brent Garrett	Garrett Consulting	External Evaluator	6	2%

Other

No charges are included in this line.

Training Stipends

This line includes all stipend costs associated with educator training, workshops, unit and assessment development, and piloting of units and assessments.

Indirect Costs

Indirect charges will be charged in accordance with federal regulations. NDE's indirect cost agreement with the ED allows for an unrestricted rate of 12.7% to be charged. Indirects are taken on all direct NDE expenditures, the first $25,000 of each contract and no indirects are taken on grants awarded to subrecipients. The Learning Sciences Research Institute has agreed to also adhere to the unrestricted rate of 12.7%.

Total Costs

The total costs for the project are broken out by year and category in the table below.

Total Project Costs

Line	Year 1	Year 2	Year 3	Total
Personnel (NDE)	$68,000.00	$70,000.00	$72,000.00	**$210,000.00**
Fringe (NDE)	$31,280.00	$32,200.00	$33,120.00	**$96,600.00**
Travel	$19,467.00	$29,200.50	$29,200.50	**$77,868.00**
Equipment (NDE)	$25,000.00	-0-	-0-	**$25,000.00**
Supplies	-0-	-0-	-0-	-0-
Contractual	$791,454.32	$880,290.63	$805,379.55	**$2,477,124.50**
Construction	-0-	-0-	-0-	-0-
Other	-0-	-0-	-0-	-0-
Total Direct Costs	**$935,201.32**	**$1,011,691.13**	**$939,700.05**	**$2,886,592.50**
Indirect Costs (NDE)	$24,426.00	$24,426.00	$24,428.00	**$73,280.00**
Training Stipends	-0-	$24,570.00	$15,435.00	**$40,005.00**
Total	**$959,627.32**	**$1,060,687.13**	**$979,563.05**	**$ 2,999,877.50**