

An Exploration of the Alignment of SLDS Infrastructure and Data Highway to Relevant Success Indicators in Mathematics and Science

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Potentially addressing all indicators

STEM Indicators: Background

A 2011 National Research Council report identified methods for tracking progress toward the report's recommendations on successful STEM education.

NRC convened a committee on the Evaluation Framework for Successful K-12 STEM Education.

14 Indicators were linked to the recommendations.

Key indicators related to students' access to quality learning, educators' capacity, and policy and funding initiatives in STEM.

Monitoring Progress Toward Successful K-12 STEM Education

A NATION ADVANCING?



NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

The 14 STEM Indicators

1. Number of, and enrollment in, different types of STEM schools and programs in each district.
2. Time allocated to teach science in K-5.
3. Science-related learning opportunities in elementary schools.
4. Adoption of instructional materials in grades K-12 that embody the *Common Core State Standards for Mathematics* and *A Framework for K-12 Science Education*.
5. Classroom coverage of content and practices in the *Common Core State Standards for Mathematics* and *A Framework for K-12 Science Education*.

The 14 STEM Indicators

continued

6. Teachers' science and mathematics content knowledge for teaching.
7. Teachers' participation in STEM-specific professional development activities.
8. Instructional leaders' participation in professional development on creating conditions that support STEM learning.
9. Inclusion of science in federal and state accountability systems.
10. Inclusion of science in major federal K-12 education initiatives
11. State and district staff dedicated to supporting science education.

The 14 STEM Indicators

continued

12. States' use of assessments that measure the core concepts and practices of science and mathematics disciplines.
13. State and federal expenditures dedicated to improving the K-12 STEM teaching workforce.
14. Federal funding for the research identified in *Successful K-12 STEM Education*.

Context for Examination

The statewide longitudinal data systems (SLDSs) may be a resource and repository for the needed data elements to address the STEM indicators of success at the state and national levels.

- Some may be addressed through either existing data elements or minor modifications to them
- For others, additional data collections may be needed that could eventually become part of SLDSs.
- For still others, SLDSs are not an appropriate source of the desired data.

Project Work - Methods

- Task 1: Consult with SLDS experts
- Task 2: Examine the indicators and data that could potentially serve national and state needs
- Task 3: Examine available data dictionaries from federal and state levels. Examine the CEDS and CRDC databases
- Task 4: Document existing data collection protocols and mandates
- Task 5: Analyze and ascertain the feasibility of changes
- Task 6: Summarize and share findings

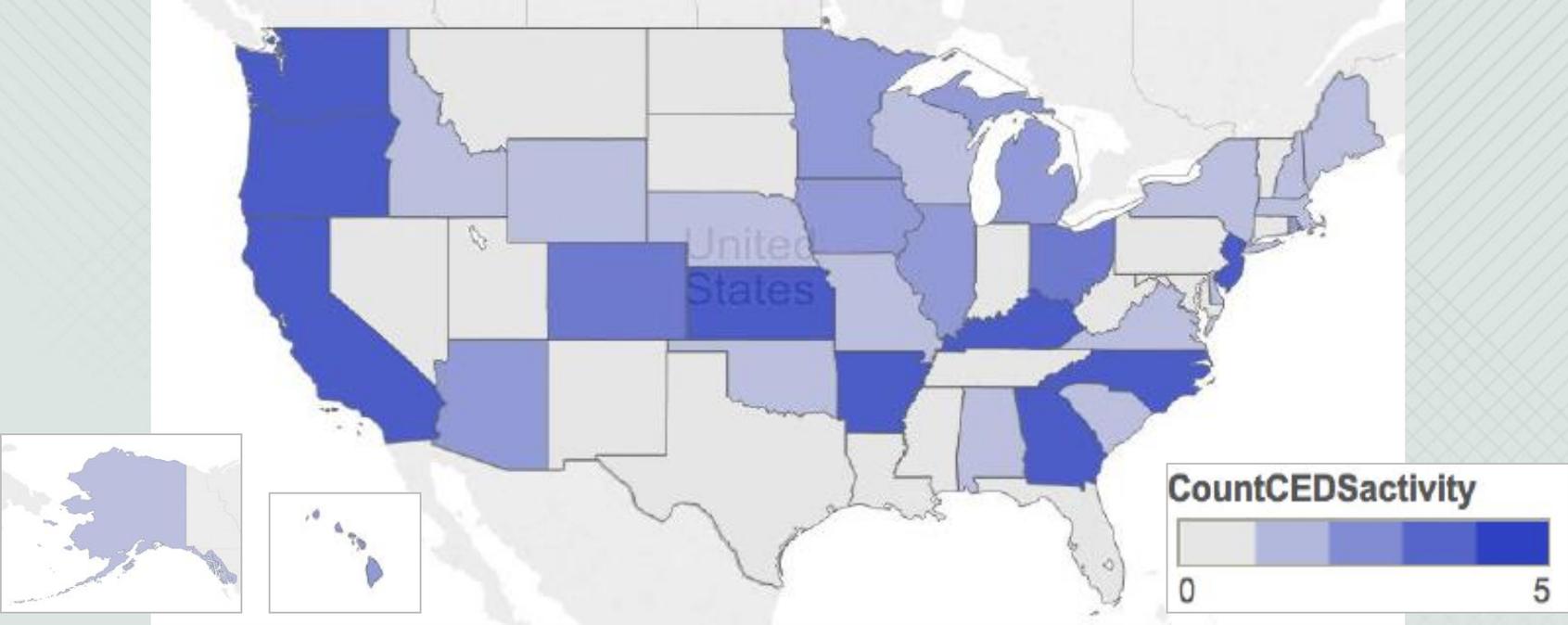
What Our STEM Experts Have Done

Examined the CEDS and CRDC databases for descriptions/elements aligned to addressing selected indicators.

Ascertained what data currently exists for these indicators in states participating in CEDS.

Generated notes about richness of the existing data dictionary descriptions and elements for addressing indicators.

We Know States are Using CEDS but.....



Some of the Findings

Preliminary Definitions of Usefulness for Indicator Research

The kinds of data provided by the states have varying levels of usefulness for addressing the indicators.

Data pathways and particular elements were identified for alignments. They were coded for their utility from highly useful, moderately useful, to limited use. Limited use means that that significant amounts of additional information would be needed to address an indicator.

Note that some limited use data elements might be able to be combined.

STEM Indicator 1 – STEM Schools & Programs

Of moderate use is the data element “Magnet or Special Program Emphasis School” – moderate because there also needs to be an element (that does not currently exist) like “Target of school program” to tell whether the special emphasis was STEM-related.

The CEDS tool tells us that five states (CA, WA, KS, KY, and GA) likely have somewhat useful data to address this indicator.

STEM Indicators 2 and 3 – Time and Opportunity for Learning Science, Grades K-5

For Indicator 2 – CEDs tool reveals that seven states (CA, WA, KS, AL, KY, GA, and NC) have data elements that can help to address Time Allocated to Teach Science in K-5.

For Indicator 3 – eight states (CA, WA, KS, AL, KY, GA, WV, and NC) have data elements that can help to address Science-Related Opportunities in Elementary Schools.

STEM Indicator 6 – Teacher STEM Knowledge for Teaching

Data in the element *Highly Qualified Teacher Type* would be of direct use to compare states on Indicator 6 (CA, AL, AR, NC, and NJ reported this element; WV had an element Teaching Credential Type as a highly useful indicator).

California had a highly useful element Highly Qualified Teacher Type and moderately useful Highest Level of Education Completed (but need additional information of content area)

CEDS tool reveals that other states did not have data aligned to Highest Level of Education Completed but did have Academic Award Title and Academic Award Level Conferred.

STEM Indicators 7 and 8 – STEM Professional Development (PD) for Teachers and Leaders

Based on the CEDS tool, the data element *Professional Development Activity Credits* would need to be combined with other elements like *Professional Development Activity Type*, *Professional Development Activity Description*, and *Professional Development Activity Audience*, to create a collection of elements that would be of use in addressing a question related to Indicator 7 like “What PD opportunities have happened for life science teachers across the U.S.?”

A Question: Can CEDS address a more basic level. For example, can average number of hours in STEM PD be calculated? This could serve as a basic measure of exposure.

Some Caveats

CAVEAT 1 – States may have different useful elements and use of various elements in combination may be best.

CAVEAT 2 – Every state may have promising elements in their data collection not revealed through the CEDS analysis. We need to contact the SLDS directors to determine if there are useable elements beyond what was found in CEDS.

By Indicator: Some Examples of What Might be Possible

Indicator 1

Title 1 – Program Science Assistance (WA)

Multiple state have assigned Magnet or Charter Schools (e.g., STEM) (CA, GA, KS, KY)

Indicator 2

Multiple states indicate grade levels, course, or period allocations – not specific to STEM (AR, CA, GA, KS, NC, WA)

CA has specific time element identifiers tied to subject STEM

More Examples

Indicator 3

A few states indicate “Course” or “Course Section”, “Course Title”, “Course Description”, “Course Identifier” and “Course Title” (NJ, NC, KS)

These elements related to science-related opportunities in elementary schools but are they sufficient?

And More

Indicator 6

Teacher knowledge in CEDS may be measured by taking into account certification, credentialing, special technology standards' skills, and highest level of education, or degrees teachers hold. (AR, CA, KY, NC, NJ, WV)

Our searches noted the concept of Highly Qualified teachers, evaluation outcomes from PD, and administrative/faculty performance levels' evaluation. (Ed-Fi Alliance, MSDF, ESP and *EDFacts* Collaborative, Shared Learning Collaborative)

By Indicator

Indicator 7

Our findings indicate that SLDSs have data elements about PD, including description of PD offerings, locations, funding sources, PD providers, etc. but the elements do not allow for a direct correspondence between data element and indicator. Significant data manipulation may be required.

In CEDS, no specific data element identifies teacher development in STEM (e.g., STEM PD)

And Finally

Indicator 8

As accessed through CEDS, the only state that shows an indicator to support teacher *and* leader PD (although not specific to STEM) was NJ.

The next closest type of information that may include leadership in the support of STEM learning conditions or participation in PD would be school level program types or certifications for administrators (CA, KY – not specific to STEM)

Looming Questions

What do you make of the analysis and how should we interpret it's import for informing our investigation?

Are there other databases or data silos at the federal level that should be tapped? If yes, is there interoperability with *EDFacts* and CEDS?

At the state level, are there unique data elements in the SLDSs that are not reflected in CEDS which could be gathered from data dictionaries and inform the process?

At the local level, are there data elements that can inform the process?

Next Steps

Work with the Forum and members

To consider if the SLDSs are a viable repository of data to address the STEM indicators. To discuss the potential of including relevant data elements into data collections.

Reach out to SLDS directors

One of our tasks is to bring together a group of SLDS directors to discuss the project's findings and discuss issues around the needed data elements, determining the feasibility of elements in future data collections.