



DATA LITERACY

October 15, 2021, 2:00 – 3:30 PM ET



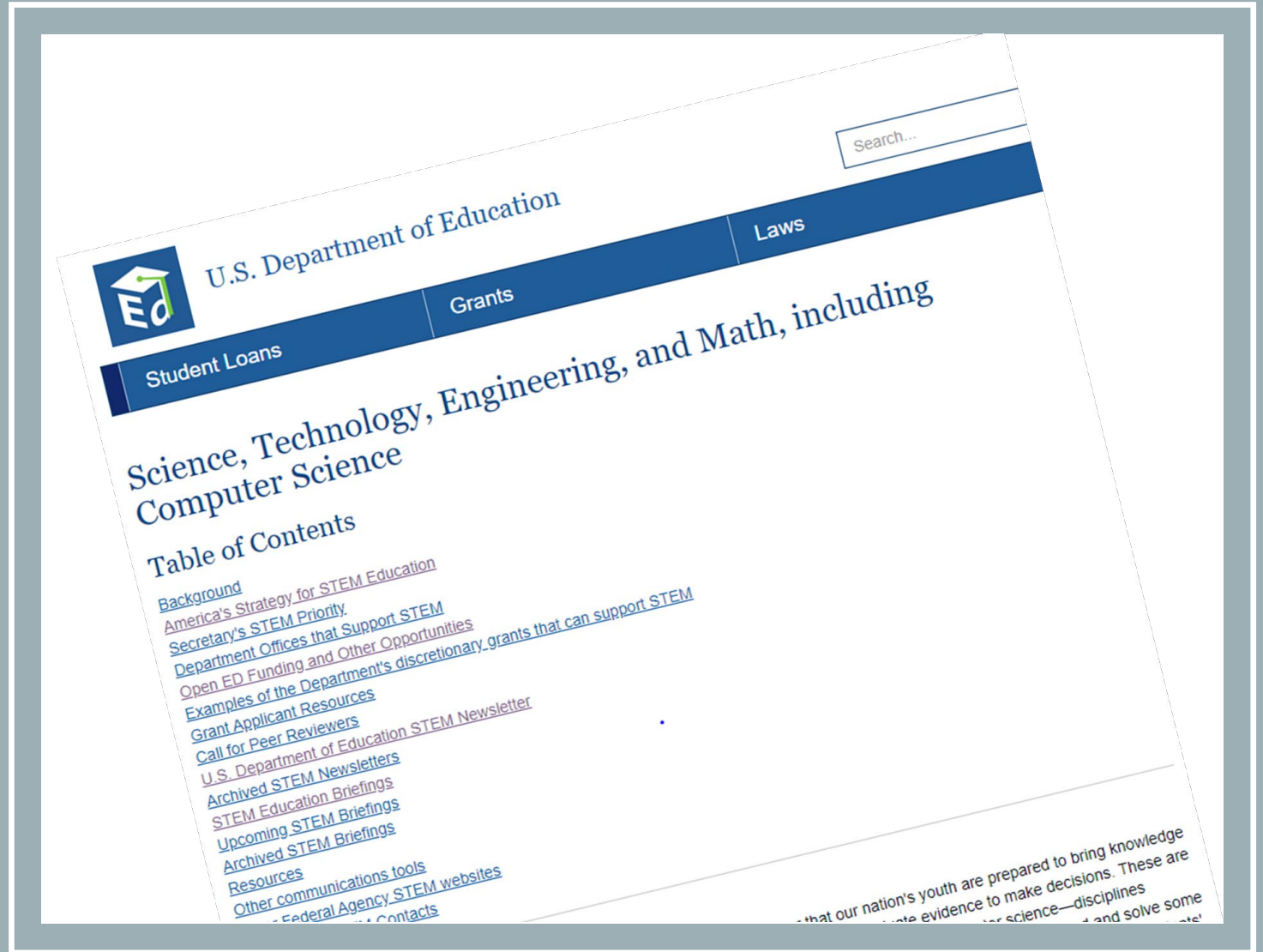


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U.S.
DEPARTMENT
OF
EDUCATION
STEM
RESOURCES

ED.GOV/STEM





CONTEXT: DATA ON DATA SCIENCE

- Top Jobs Demanded in 2020 Globally (World Economic Forum)
- Top 10 Jobs in 2017, 2018, and 2019 (LinkedIn)
- Top 5 Skillsets Demanded since 2014 (LinkedIn)

We know these skillsets are important for personal finance, health, and civic engagement.

NATIONAL SPREADSHEET DAY

OCT 17



DEPUTY SECRETARY
CINDY MARTEN

U.S. Department of Education





STEVEN LEVITT

Freakonomics Co-Author

William B. Ogden
Distinguished Service
Professor of Economics,
University of Chicago

[Freakonomics Podcast #391](#)

TRENA WILKERSON

President, National Council of Teachers for
Mathematics



Data Literacy

Data Science Mathematics, Statistics, and the Disciplines

Trena L. Wilkerson, NCTM President
Professor of Mathematics Education
Baylor University

www.nctm.org

twilkerson@nctm.org



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

Key Considerations

- Understand and critique our world
- Expand opportunities
- Critical thinking skills are essential
- Vital for both STEM and non-STEM fields
- Imperative for all students
- Make connections across and within disciplines/fields-
Understanding Context

Fostering data literacy includes

fostering mathematics, statistics, quantitative, media, and discipline specific literacy to equip students with the knowledge and resources needed to make sound, informed decisions and to solve problems arising in their personal and professional lives as members of society.

NCTM's [Catalyzing Change](#) Series for Early Childhood and Elementary Mathematics (2020), Middle School Mathematics (2020) and High School Mathematics (2018)



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

Partners & Stakeholders

- Families/Caregivers
- Communities
- Teacher Educators
- Businesses
- Schools-teachers, administrators, school boards, Pk-12+
- Post-Secondary Education
- Curriculum & Assessment Writers/Developers

Data Literacy

- Equity Stance/Lens
- Build/foster/support positive identity
- Inclusive across Pk-12
 - Meaningful, thoughtful approach
- Rethink/Reimagine statistics education
- Interdisciplinary approach
- How to support ALL teachers in this work

An imperative!

The development of statistical thinking is an imperative today. Every individual must be able to synthesize data to support decision making, make sense of our world, and prepare for the future.

[November 2020 President's Message](#) (Wilkerson)



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

An Imperative for Our Future

“Making a difference will require collaboration, communication, and work across diverse groups and communities, but engaging in these conversations is our collective responsibility to the students of today and tomorrow, as well as to our democratic society at large”

(Catalyzing Change in High School Mathematics: Initiating Critical Conversations, NCTM 2018, p. 93)



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS



JO BOALER

Nomellini & Olivier
Professor of Education,
Stanford University
Director, youcubed

Introduction – Youcubed Data Science

Jo Boaler,
The Nominelli-Olivier
Professor of Mathematics
Education
@joboaler



Stanford
University





- Our goal is to share free resources for teachers & students showing the beauty and creativity in open mathematics & data science
- Over 53 million visits to website in last 5 years
- Hundreds of free tasks & lessons K-16
- Used in 2/3 of US Schools
- 145,000 newsletter subscribers
- TEDx talks – over 1.5 million views
- Newsletters opened in over 160 countries



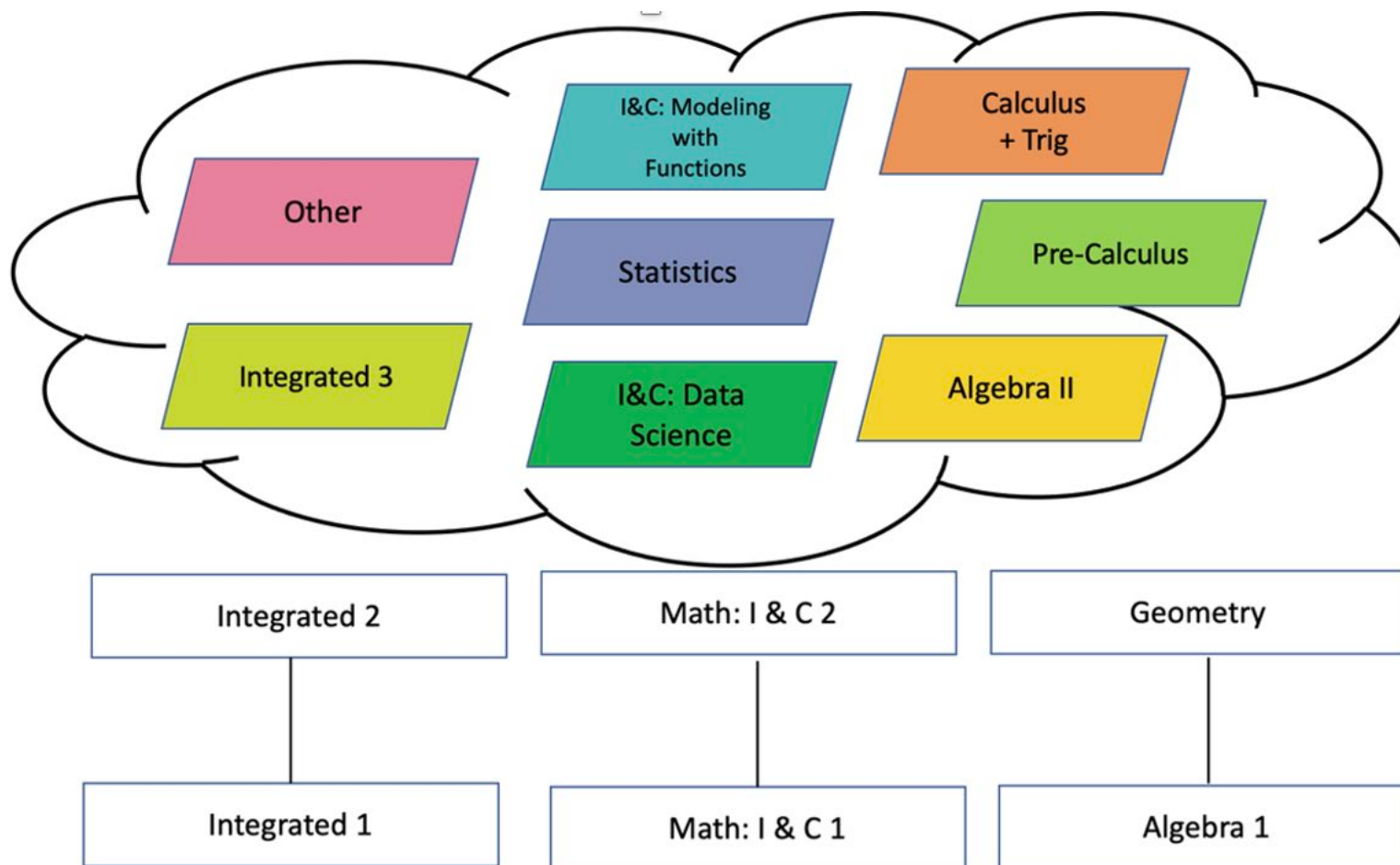
California Mathematics Framework

Data Science K-12
is highlighted

Data Science can be an
equitable pathway



High School Pathways – in California and beyond



BIG IDEAS

A Selection of Big Ideas from Data Science – from GAISE II (2021).

Co-author:
Rob Gould

Integrating
data science
into the
content
being taught



Formulate statistical investigative questions

- Formulate statistical investigative questions
- Students generate ideas and ask questions – creating and refining statistical investigation questions

Collect/consider data

- Students learn what counts as data (eg visuals, sounds, numbers, categories) and understand that people collect data to answer questions
- Students develop

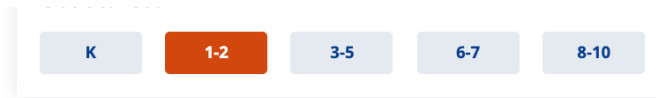
Analyze data

- Students develop ways to represent and interrogate data to notice, describe and analyze patterns
- Students recognize variability and use technology to develop models that incorporate

Interpret and communicate

- Students decide key results to include in a data report that answers the statistical investigative question
- Students communicate their results through, for example, a data visual, a

Example of “Big Ideas” for Grades 1-2



Grades 1-2

Big Ideas



Formulate statistical investigative questions

- Develop curiosity through noticing and wondering about data rich situations.
- The teacher helps refine, direct and create statistical investigative questions.

Collect/consider the data

- Learn about what counts as data and understand that people collect data to answer questions, and that data can vary (eg objects have different colors or sizes).
- Work with categorical and numerical (whole number) data.
- Consider and decide: What data will answer my question?
- Collect survey data (eg, favorite pets) or use data given by teacher (eg, ladybug data cards).

Analyze

- Develop ways to represent data as tally marks, drawings, or digitally on a tablet or laptop.
- Students use data visualizations to look for patterns that allow them to make predictions.
- Students notice the likelihood of various outcomes, and variation across them.
- Explore mode — thinking conceptually about the data point(s) that happen the most.

Interpret and communicate

- Decide key results to report that answer students' initial questions.
- Make a data report: poster, video, news article, etc.
- Make predictions using the terms: "likely, unlikely, certain, and impossible".

Grades 1-2

Tasks



[Ladybugs \(from GAISE II pages 31-35\)](#)



[Growing Beans \(from GAISE II pages 35-38\)](#)



[Lots of Buttons \(Coming Soon\)](#)

Grades 1-2

Data Talks



[Popular Fruits](#)



[Hand Washing](#)



[Favorite Season](#)

Over 10,000
visits since
Monday!!

Online Class to excite teachers about data science

Taken by over 20,000
teachers

What is Data Science
and why it is important?

Teaching Examples –
Classroom Video

CODAP Explorations

Teaching Content –
Probability & Statistics

Student Videos for Use
in Classrooms



21st Century Teaching and Learning: Data Science

Our newest online course,
focused on integrating data
science into teaching

[Part of the State of Utah Data Science Credential](#)

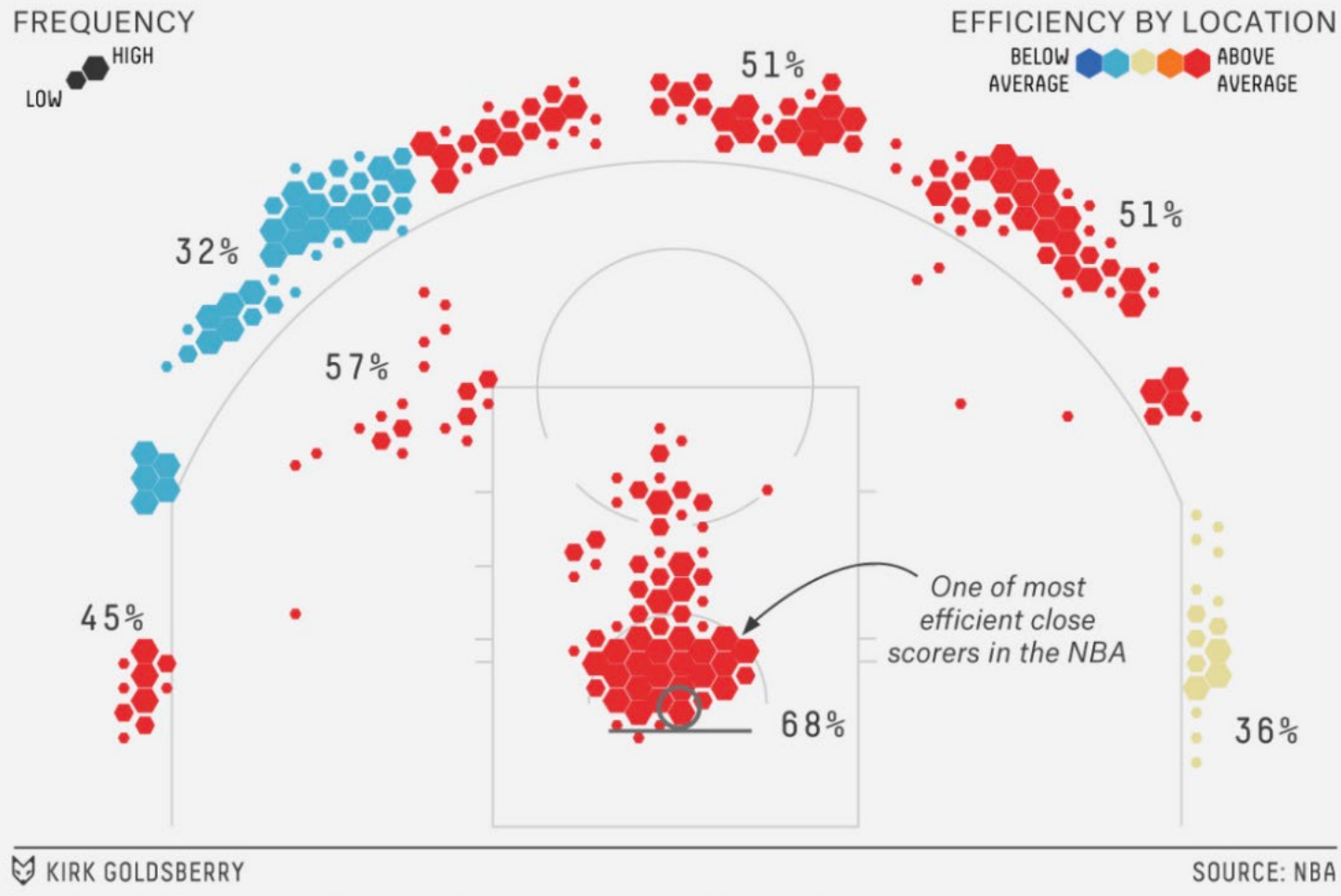
Facebook group: 2.7K members

K-12 Data Talks

- What do you notice?
- What do you wonder?
- What is going on in this data visualization?

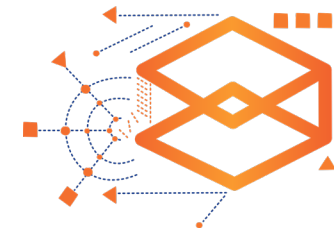
Stephen Curry Is One Of The Best

All of his shots, 2015-16 regular season

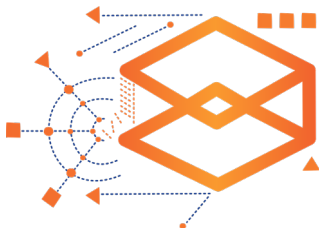
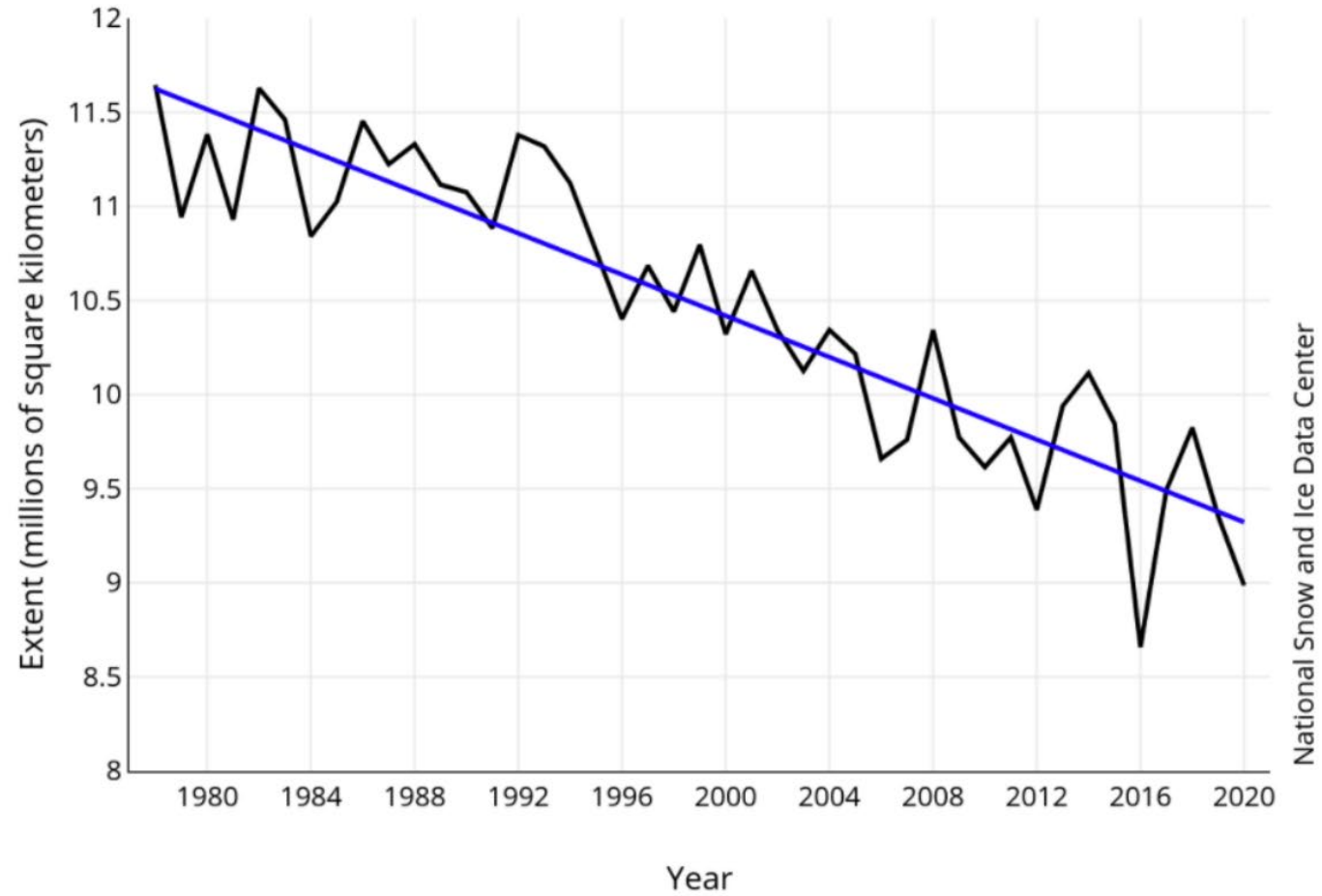


- What do you notice?
- What do you wonder?
- What is going on in this data visualization?

<https://fivethirtyeight.com/features/stephen-curry-is-the-revolution/>

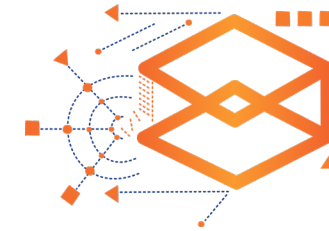


Average Monthly Arctic Sea Ice Extent
November 1978 - 2020

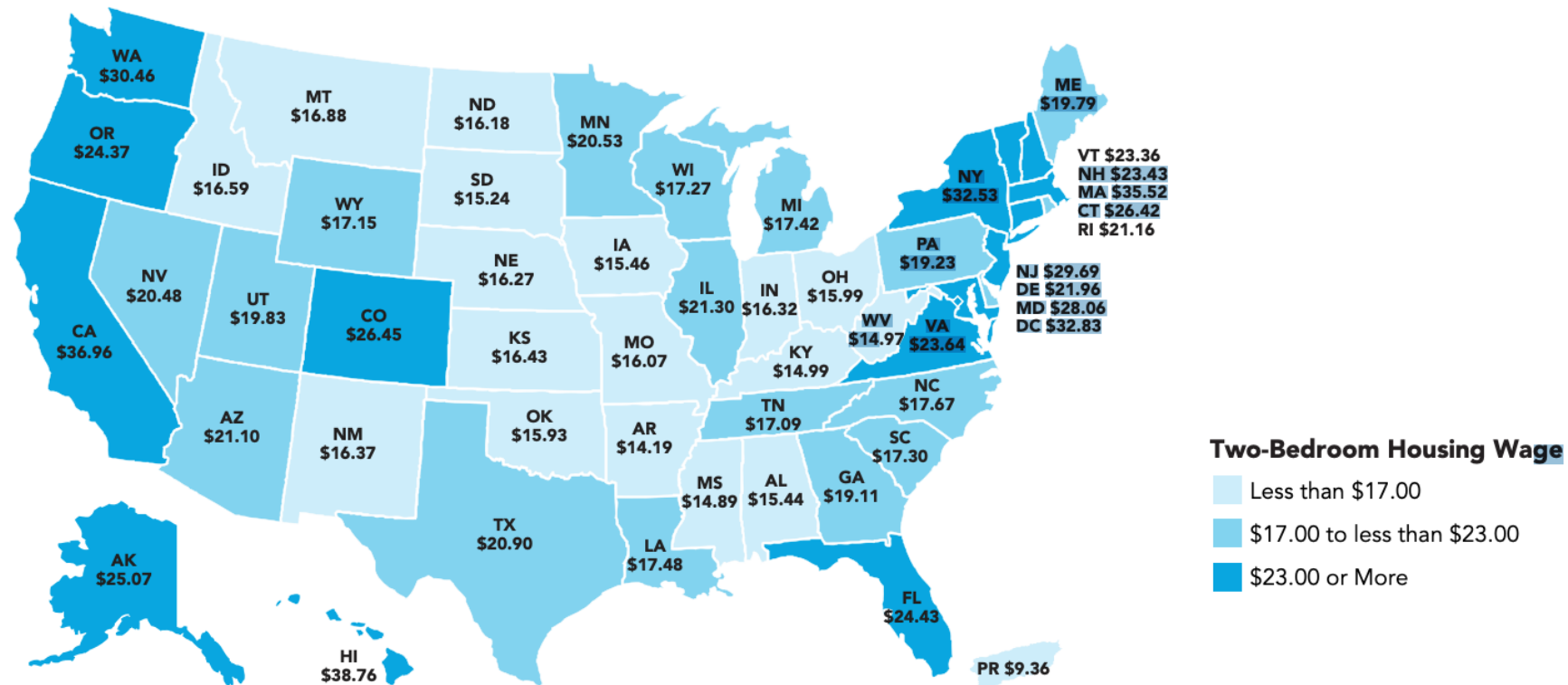


Pola Bear declines





2020 TWO-BEDROOM RENTAL HOUSING WAGES

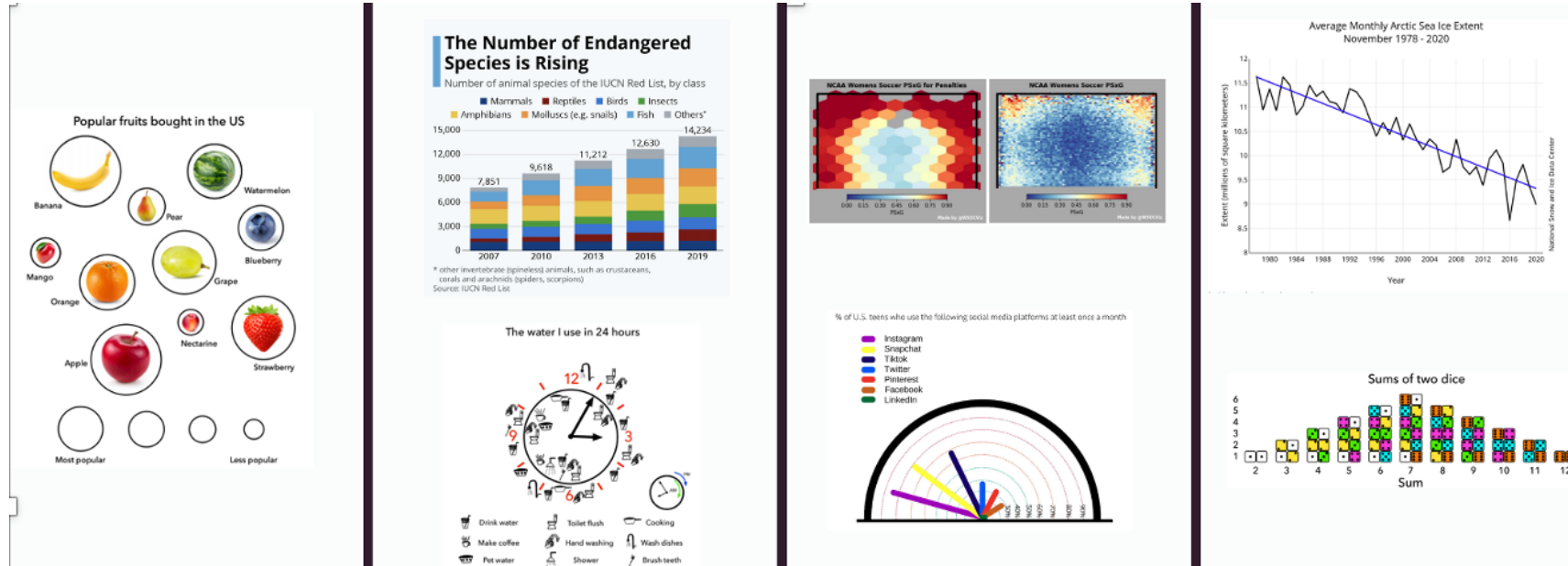


A **living wage** is a wage that is high enough to maintain a normal standard of living.

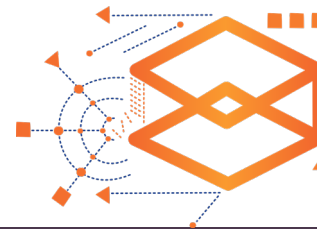
A **minimum wage** is the lowest an employer can pay an employee for their work.

A **housing wage** is an estimate of the hourly wage a full-time worker must earn to afford a modest rental home without spending more than 30% of their income on housing costs.

Youcubed – data science – data talks



Over 100,000 Downloads



Youcubed Data Science Resources: Grade 6-10 Lessons

Lessons



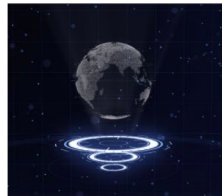
Teacher Online Course:
21st Century Teaching
and Learning



Unit 1: Data Is
Everywhere



Unit 2: Working With
Data Analysis Tools



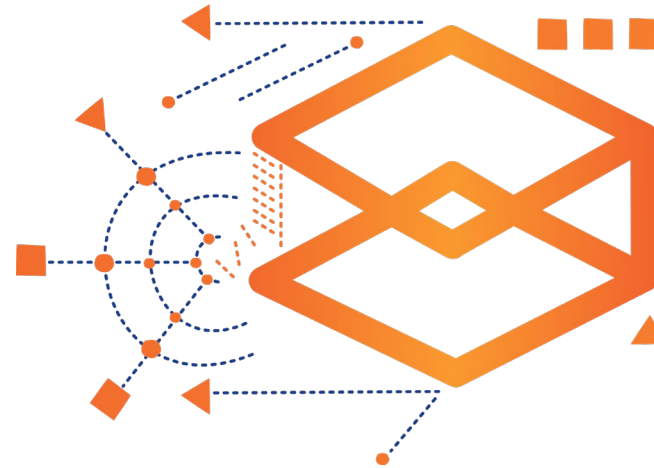
Unit 3: Measures of
Center & Spread



Unit 4: Understanding
Variability



Unit 5: A Community
Data Collection Project



Over 30,000 downloads



High School Course:
Explorations in Data Science:
Youcubed Adaptable Curriculum



Partnered with
Google &  + a b l e a u[®]

Youcubed Adaptable Curriculum– in partnership with Google



Free with low Barrier for Entry



Widely Accessible Tools



Low-Floor, High Ceiling – Project based



Live and Current Datasets



Use of Local & Customizable Data



Broad Flexibility for Individual Settings

Academic Advisors

and

Industry Advisors



Talithia Williams
Dept of Mathematics
Harvey Mudd



Rachel Levy
Mathematician



Elena Grewal
Previously Head of
Data Science
Airbnb



Evan Shieh
Data Scientist
Amazon



Rob Gould
Dept of Statistics
UCLA



Steve Levitt
Economist
University of Chicago



Jeff Feng, Airbnb
Head of Machine
Learning



Ellen Huynh, Airbnb
Senior Program
Manager

Project Based

Youcubed: Explorations in Data Science: 8 Units

Data
tells a
story

ACS Data
Distributions

Bivariate
Data

Probabilistic
Modeling
Data tells a
story

Data
Categorical
Data tells a
story

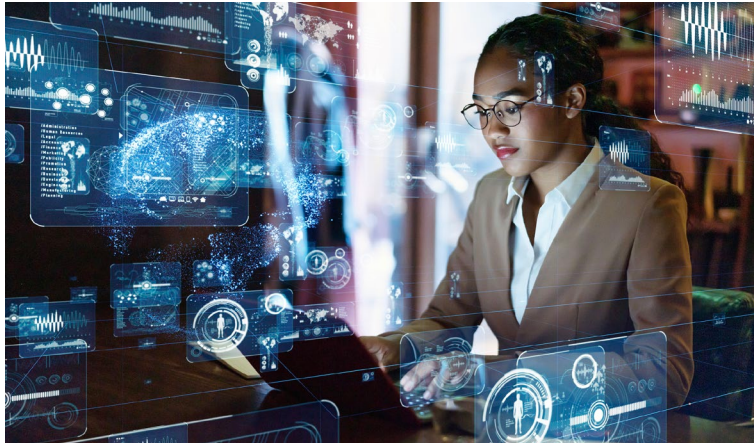
Modeling
with Data

Data
Predictions

Being a
Data
Scientist

A Project Based One Year Course

Encouraging Student Agency



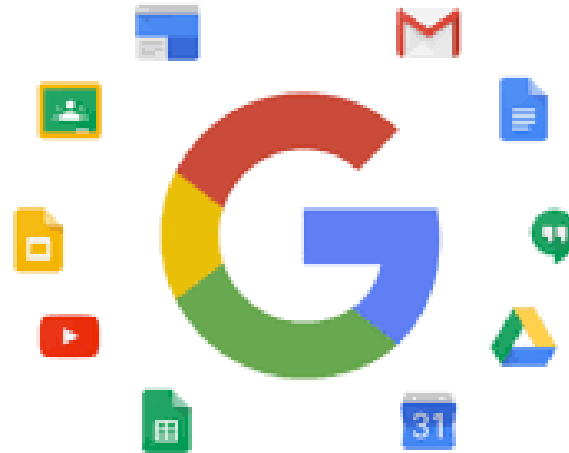
Students ask their own questions & investigate data sets from their own communities



What will students learn?



SEM logo



CODAP



The mathematics of high school data science

Statistics

Probability

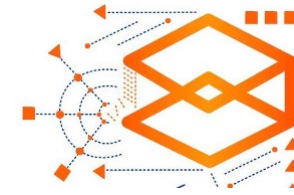
Matrices

Linear Algebra

Computational
Thinking

Programming

Who is taking our data science course?



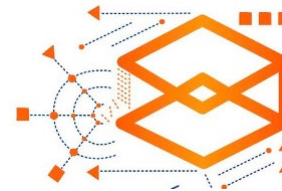
- 1500 accounts made, 100,000 page views
- This year - 575 teachers in 500 different schools/districts
(220 have been to our PD)
- Over 30,000 students
 - 46% girls/non-binary
 - 40% students of color
 - 58% not mathematically accelerated

High School Professional Development Workshops @youcubed.
In person and online

Enjoyment & Engagement

Data Science

- This is the most interesting course I have taken. An profound analyzation of data feels like deciphering a crime scene for clues. .
- It's fun. It's like you're a research expert.
- Everyone is involved in group projects no matter what, which is what makes it a great course.



In comparison to other classes

- It's a well thought class that does not overload you with work and tests.
- Even the grading scale is fair & I won't worry if I need to fix an assignment
- This course definitely surprised me after being enrolled to it for a month now. I enjoy it a lot more than I thought. From how the grading works, to the curriculum, or the communication this class has. It's such a great way of learning along with it also being a very enjoyable class.

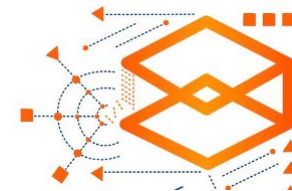
Challenge

Data Science

- This data science course is challenging **but in a good way.**
- I think it can be very challenging **but working groups and the help of our teacher, it's more understandable**
- I would describe it as challenging, fun, and creative because some **tasks are challenging and yet you get to be creative.**

Other Maths Classes

- In normal integrate/pre-cal classes **I'm always lost and behind.**
- I think this course is interesting and funner to learn. I am enjoying it because there is more group discussion and more projects **so you aren't just sitting in class bored and confused**



Learning from Data Science



- Data science is something you will eventually need. I personally recommend it to anyone who's thinking of it. It's the class of the future.
- I really like this class and I hope to see it being added to more high schools
- It's a class that helps with deep thinking on data that helps to understand how data is collected and useful. It brings the side of critical math thinking that I didn't know I had
- I realized many things about myself and other things I like ever since I've been in this class.

Initiative to Change University Admissions



Stanford change...

Mathematics: four years of any rigorous mathematics incorporating a solid grounding in fundamental skills (algebra, geometry, trigonometry). We also welcome preparation in skills related to **statistics, data science** and calculus.

Data Science throughout K-12

- New Initiative from the State of California
- Big Ideas instead of standards
- Mathematics writing team: Jo Boaler & Cathy Williams

California Maths

Jo Boaler is one of the writers of the proposed new mathematics framework for California, which you can see in its entirety by clicking below. The California Department of Education has also released Digital Learning Integration & Standards Guidance—you can click below to see the full CDE web page, or download a document with the mathematics standards. Jo Boaler and Cathy Williams were asked to prioritize mathematics standards, which they did by raising the standards to the level of “big ideas”, highlighting mathematical connections through network maps. One of the big issues addressed in the new framework is the ways students are systematically excluded from higher level content through tracking. If you are an educator who has worked to detrack, or perhaps you are setting out on that journey now, and would like to connect with others, you can also register below for a free convening on June 21!



California Mathematics Placement Act
A state law concerning fair, objective, and transparent placement policies



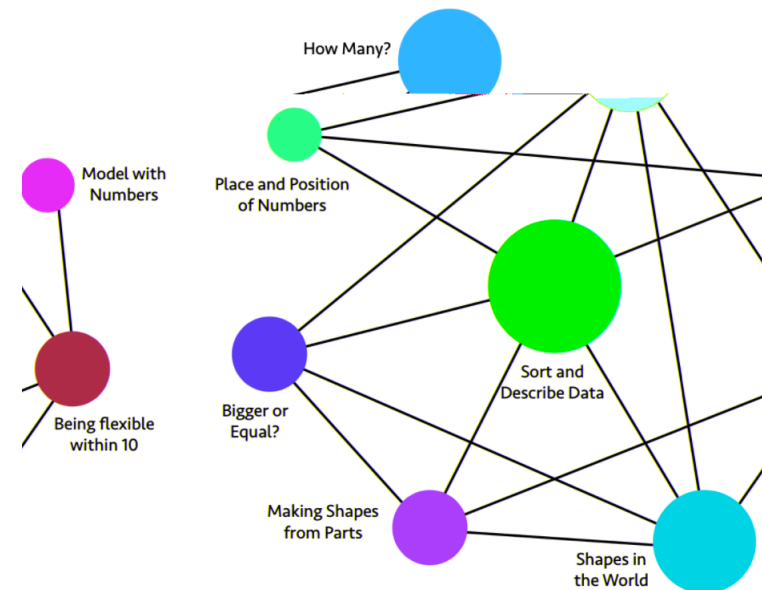
California Mathematics Framework
Draft 2021 framework for public schools, kindergarten through 12th grade



Digital Learning Integration & Standards Guidance
California's distance learning curriculum and instructional guidance



Standards Guidance for Mathematics
An extract from the California Digital Integration and Standards Guidance





SUYEN MACHADO

Co-Author, Introduction to Data
Science

UCLA, Center X

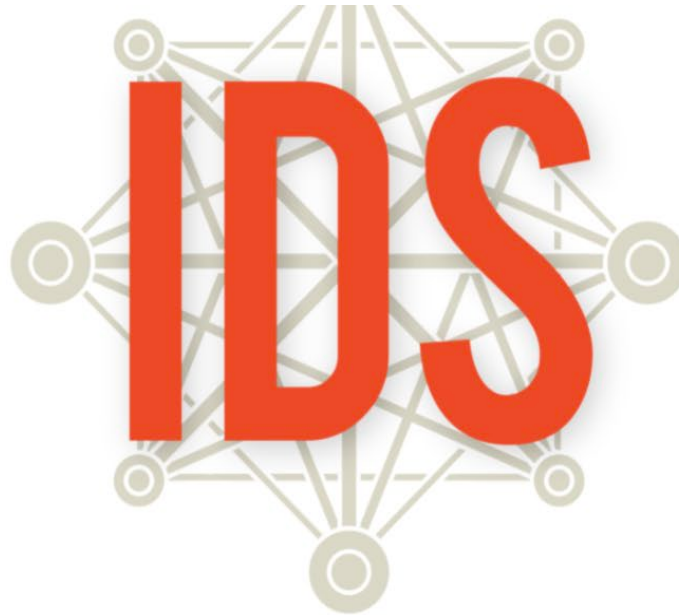
Introduction to Data Science (IDS) for High School Students

Suyen Machado

Co-author & Director, Data Science Project

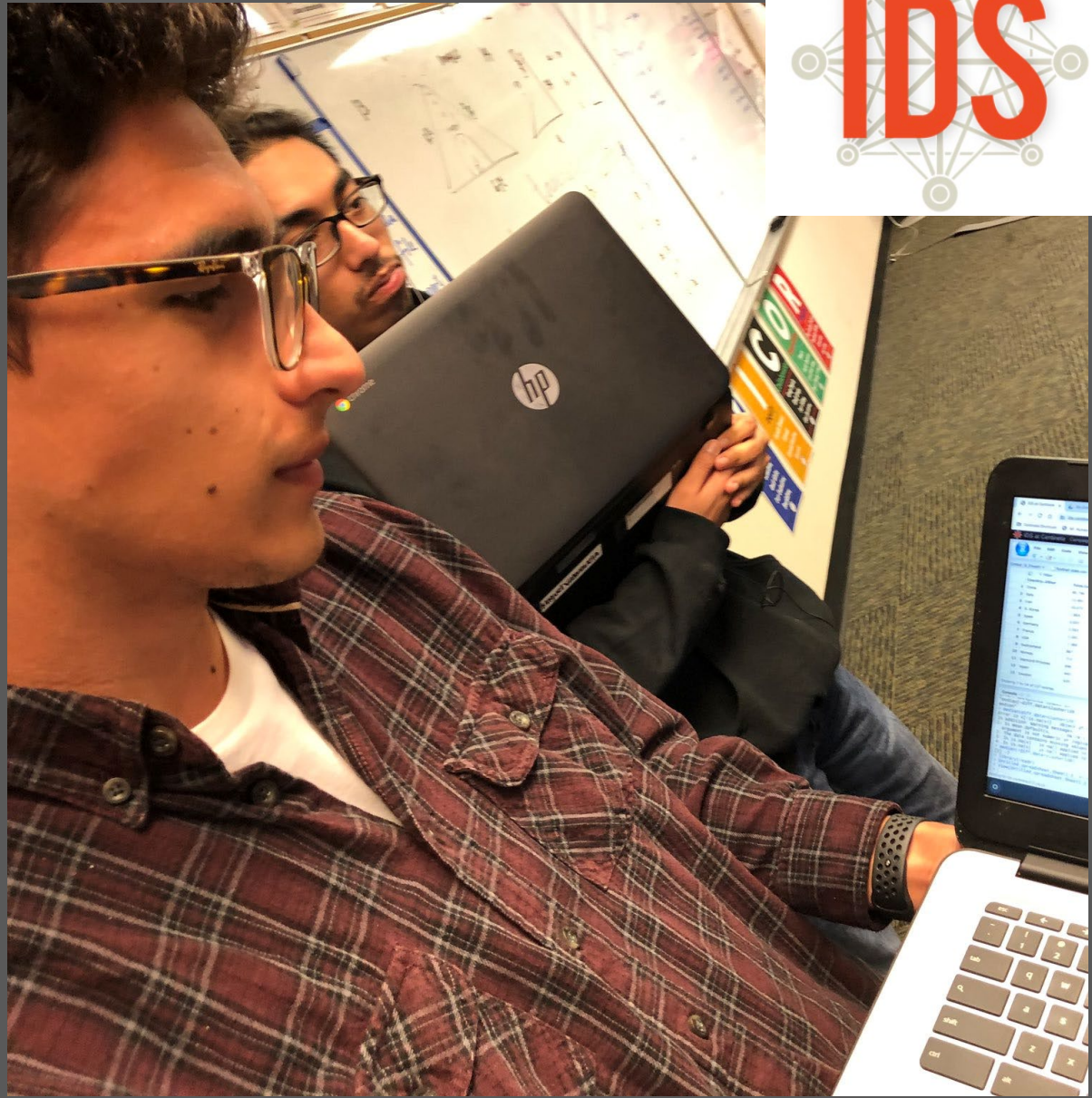
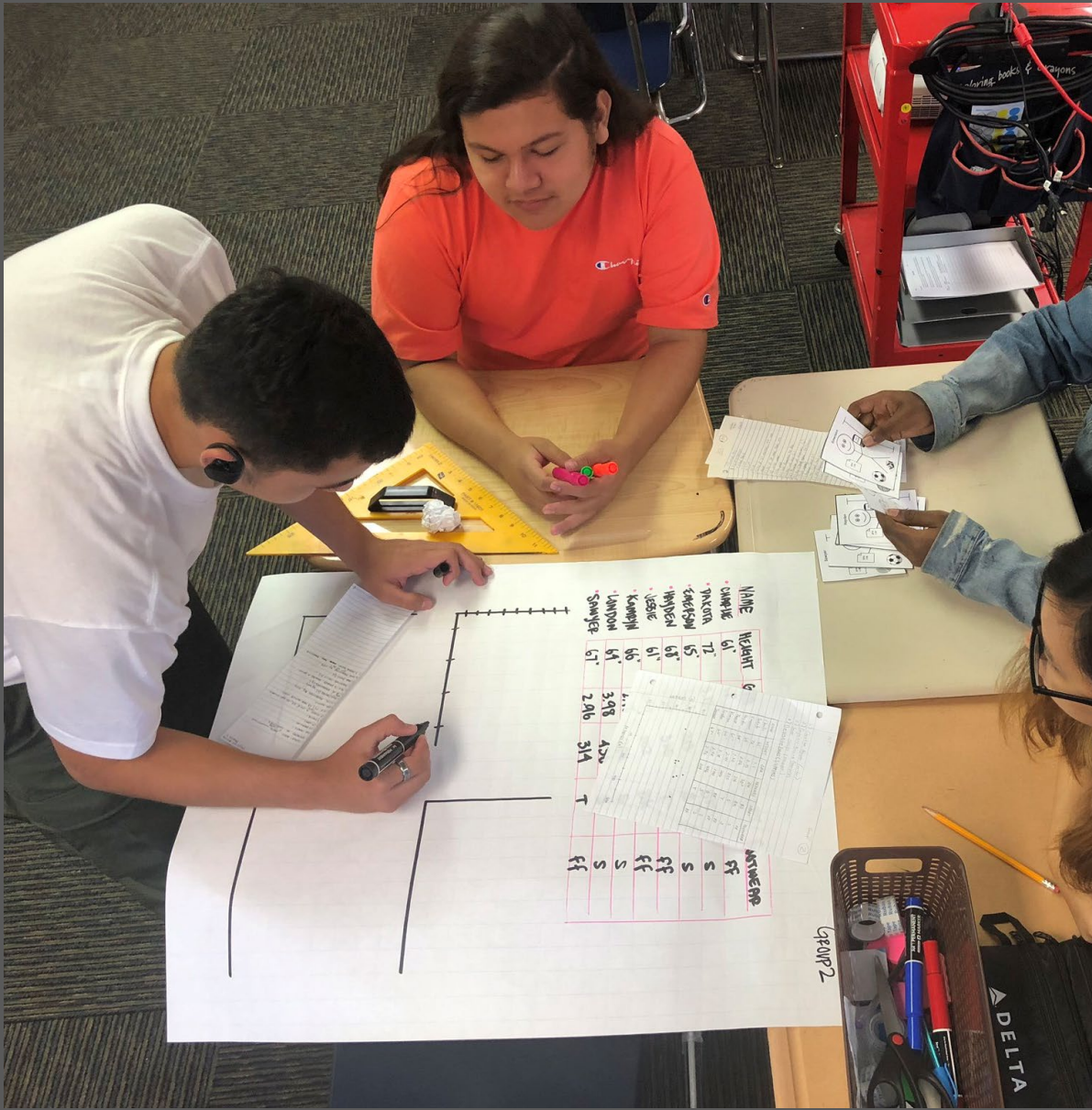
University of California, Los Angeles





Introduction to Data Science







Retrieved from: <https://nasaclips.arc.nasa.gov/teachertoolbox/the5e>



The Data Science Test

- Awash in Data
- Data Moves
- Data Properties



IDS Components



Introduction to Data Science

Robert Gould
Suyen Machado
Terri Anna Johnson
James Molyneux



Web Tools :



Year-long Curriculum + Technology Suite + PD

Introduction to Data Science



IDS Curriculum

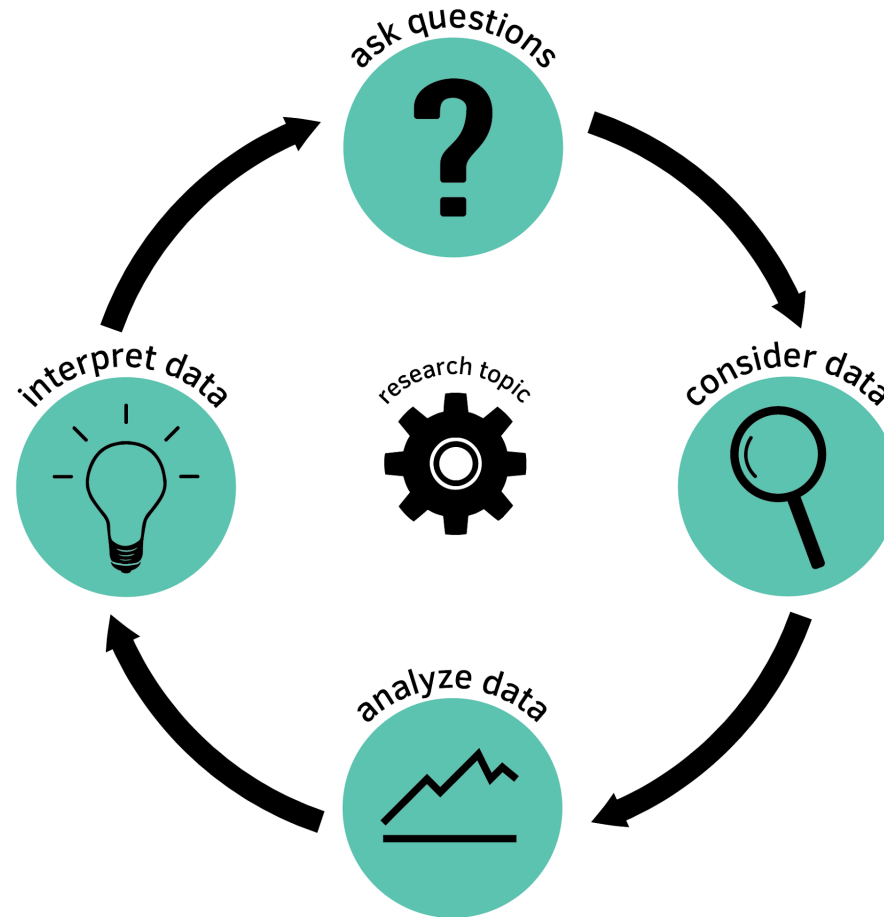
Unit 1 - *Data and Visualizations*

Unit 2 - *Distributions, Probability, and Simulations*

Unit 3 - *Data Collection Methods: Traditional and Modern*

Unit 4 - *Predictions and Models*

The Data Cycle





Introduction to Data Science



LESSONS

LABS

PROJECTS

IDS Technology



Web Tools



Participatory Sensing

PARTICIPATORY SENSING

An approach to data collection and interpretation in which individuals, acting alone or in groups, use their personal mobile devices and web services to systematically explore interesting aspects of their worlds, ranging from health to culture.

FOOD HABITS CAMPAIGN



STRESS CHILL CAMPAIGN

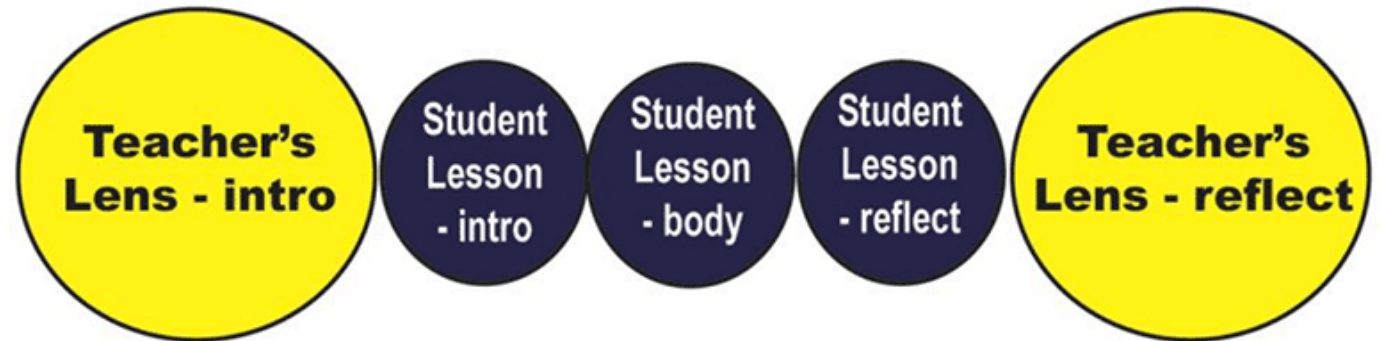


TIME USE CAMPAIGN



Professional Development

SCALE Immersion Model for Professional Learning (SIMPL™)



Source: Baxter, H., & Lauffer, D. (2007, October). The SIMPL approach to science education reform. Unpublished manuscript. Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research.







WELCOME TO THE IDS TEACHERS' COMMUNITY OF PRACTICE!

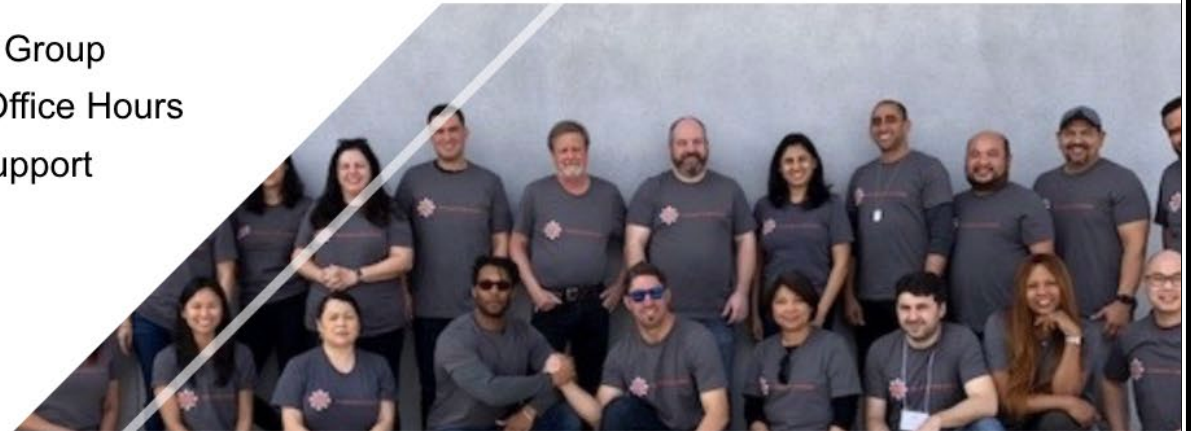
A repository for sharing resources, best practices, information,

IDS Professional Learning Community

Google Group
Bi-monthly Office Hours
24/7 support

Introduction to Data Science - Best Practices Video Series

By IDS Admin - 1 post - 1 view



Standards for
Mathematical
Practice

Computational
Thinking
Practices



Statistical
Thinking



EMMANUEL SCHANZER

Bootstrap Data Science,
Brown University





BOOTSTRAP

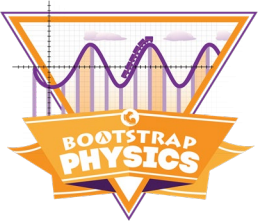
Equity • Scale • Rigor



We made a controversial bet...

- Siloed classes **aren't the only way** to do this
- Integrate computing & math **authentically**
- There's a way to do it equitably, **for all students**

15 years later....



- One of the largest providers of in-school CS nationwide
- One of three curricula cited by the NSF
- ~43% girls and young women, ~46% black and latinx students
- Taught almost entirely by **non-CS teachers** with **no computing background**, in **non-CS classes**!



Ingredients for K-12 Data Science

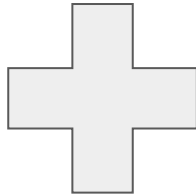
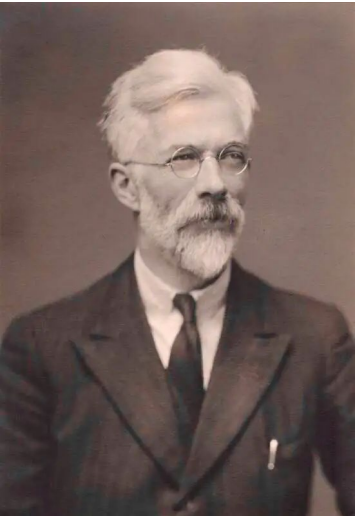
Statistics



Computing

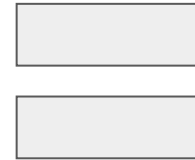


Ingredients for K-12 Data Science



```
def add5(x):
    return x+5

def dotwrite(ast):
    nodename = getNode
    label=symbol.sym_na
    print '      %s [labe
    if isinstance(ast[1
        if ast[1].strip(
            print '= %s"]
    else:
        . . . . .
```





Responsible K-12 Data Science

- **Computational Concepts**
 - Problem decomposition
 - Reliability
 - Reproducibility
- Bootstrap been focused on these concepts since the 1990s
- **“Coding” doesn’t touch ANY of them!**



Responsible K-12 Data Science

Statistics

Computing

**Civic
Responsibility**

**Domain
Investment**





“New Math” 2.0

- We want to **unleash the power of data**, across the curriculum.
- We use **free tools** - a disciplined approach
 - Elementary school: *spreadsheets*
 - Middle school: *CODAP (which we have extended!)*
 - High school: *Pyret*
- We build **free curricular materials** for grades 5-12
- An **interdisciplinary challenge** requires an **interdisciplinary team**
- We **design for integration**, creating on-ramps for teachers in every subject, at every level - **at scale**.





Find the path that's right for *your* school or district

Access totally-free curriculum and tools

Curriculum, Training and Pedagogy designed for integration

PANEL



RESOURCES

- Education Materials
- Forthcoming Guidance Resources
- Federal Funding Opportunities

Education Materials & Resources

- **NASA / Microsoft “Day of Data”** – modules for using spreadsheets to explore space data in classroom settings.
- **U.S. Census Statistics in Schools Program** – lesson plans and other resources across K-12 subjects, including math, history/social studies, geography, and English
- **U.S. Census Academy** – one- or two-hour courses on using Excel, R, and Census Data. Most relevant for adult learners and teachers.
- **Data.Gov** – a centralized housing for open Federal datasets.



Forthcoming Guidance

Purpose

Data Terms

Continuous Improvement

Planning Checklist

Step 1. Identifying Needs

Step 2. Selecting Interventions

Step 3. Plan for Implementation

Step 4. Implementation

Step 5. Examination & Reflection

Sharing Findings

Checklist for Building Data Science Education

The Department's model for the implementation—and continuous improvement—of evidence-based interventions, including those related to data education and data literacy, includes five steps.

The following checklist summarizes the key components of each step. You can also download the checklist [here](#).

1. Identify Local Needs

- ☐ Consult existing learning-based requirements and student needs
- ☐ Meaningfully engage local stakeholders
- ☐ Seek systematic alignment with post-graduation pathways
- ☐ Consider piloting first, and design for long-term goals
- ☐ Determine outcomes that matter most to your context and locality

2. Select Relevant, Evidence-Based Interventions

- ☐ Select programs that demonstrate a clear rationale and support infrastructure
- ☐ Select programs that reflect components of evidence-based practices
- ☐ Explore prior pilot programs and results from peer schools and districts



Soon Available on What Works Clearinghouse

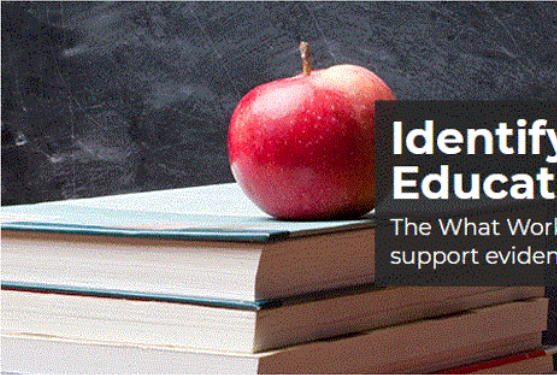
IES Institute of Education Sciences

MENU

Search

Go

EVIDENCE-BASED PRACTICES FOR RECOVERY AND RENEWAL



Identifying What Works in Education

The What Works Clearinghouse reviews research to support evidence-based decision making in education.



General Evidence Resources



Afterschool and Out-of-School Time Learning



Data Science Education

IES Institute of Education Sciences

MENU

Search

Go

All Practices Publications & Products Key Contacts

Purpose

Data Terms

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Planning Checklist

Step 1. Identifying Needs

Step 2. Selecting Interventions

Step 3. Plan for Implementation

Step 4. Implementation

Step 5. Examination & Reflection

Sharing Findings

Step 3. Plan for Implementation

Planning for implementation requires dedicated time and capacity. Note there are several suggested factors, based on the italicized sections below, that require planning. Doing more now will save time later and allow your program to contribute to broader collective learning.

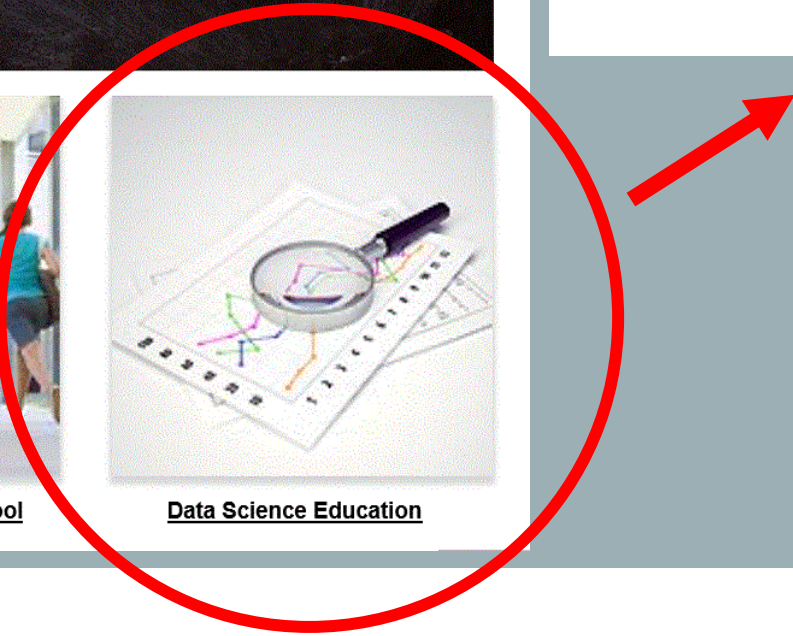
Given the early stage of research in data literacy education, it is critical that pilot programs have a plan building evidence about what works best, for whom, and under what conditions. This means your implementation should include plans for tracking student outcomes and other useful data to improve your program.

Build a logic model for your approach

☐ Use your favorite logic model design or use REL Pacific's [Logic Model tool](#) or the template provided here (See Figure 2).

☐ Ensure that your inputs and outputs included specific, quantitative measures, related to the data that you intend and are able to collect.

Logic Model: Project Name					
Problem Statement:		Goal (s):			
Inputs	Activities	Outputs	Short-Term Outcomes (Date to Date)	Short-Term Outcomes (Date to Date)	Short-Term Outcomes (Date to Date)



Funding Resources for Supporting Data Science in K-12

- American Recovery Plan ESSER Funds (includes any ESEA activity)
- Elementary and Secondary Education Act (ESEA) Title IV Part A Funds
- Teacher Quality Partnerships (TQP)
- Supporting Effective Educator Development (SEED)
- Education Innovation Research (EIR)
- Education Research Grants (ERG)
- Federal Communications Commission E-Rate Program
- NSF Harnessing the Data Revolution (HDR) Program
- NSF Research on Learning in Formal and Informal Settings (DRL)



ARP ESSER Funds

- **Any activity authorized under ESEA is eligible.**
- **Additional eligible categories include:**
 - **PD:** partnerships with PD programs, hiring & retainment, technology training & literacy, and financial support, including student loans for educators (sec. D-1)
 - **Hardware:** laptops, tablets, tech accessories, and assistive technology (sec. C-19)
 - **Software:** software/online/virtual programs and online/virtual/cultural curriculum/programs (sec. C-19)
 - **Internet:** improvements in technology infrastructure, operations, and use (sec. C-19)
 - **Out of School Time:** online program, course development, hardware, or other materials (sec. C-2, C-13)
- **Must spend by 2023** – invest in long-term contracts where possible.



Regular ED Grant Programs

- **Teacher Quality Partnerships (TQP)** – funds collaborations between eligible K-12 districts and Institutes of Higher Education for teacher training
- **Supporting Effective Educator Development (SEED)** – develop, expand, and evaluate evidence-based practices for teacher training
- **Education Innovation Research (EIR) Early Phase Grants** – create, develop, implement, replicate, or take to scale field-initiated innovations
- **Education Research Grants (ERG) STEM Topic** – research on the improvement of students' STEM knowledge and skills



Other Federal Grant Programs

- **ED Office of Education Technology Grants Hub** – centralized resource of all technology-related grants and programs.
- **FCC E-Rate** – discounts for telecommunications, Internet access, and equipment to eligible schools and libraries. **See also COVID Emergency Connectivity Fund.
- **NSF Harnessing the Data Revolution** – an umbrella program covering three grant areas for graduate scholarships, data science field research, and data science institutes.
- **NSF Division of Research and Learning** – relevant programs for data science education include DRK-12, ITEST, and AISL solicitations.





SPEAKER RESOURCES



REFERENCES & RESOURCES

National Council of Teachers of Mathematics (Presenter: Trena Wilkerson| Contact: nctm@nctm.org)

Books

- Catalyzing Change Series: <https://www.nctm.org/change/>
- K-12 Guidelines for Assessment and Instruction in Statistics Education II (GAISE II)-[Book](#) or [Free Download](#):
- Pre- High School Mathematics Lessons to Explore, Understand, and Respond to Social Injustice: <https://www.nctm.org/Store/Products/High-School-Mathematics-Lessons-to-Explore,-Understand,-and-Respond-to-Social-Injustice/>

Webinars & Web Resources

- Teacher Tip Tuesday: Avoiding Data and Science Misinformation in Today's Messy Media Landscape (Open to All): <https://www.nctm.org/online-learning/Webinars/Details/527>
- Recommendations for Statistics in the Secondary Curriculum: Implications for Teachers: <https://www.nctm.org/online-learning/Webinars/Details/357>
- The Practice of Statistics: YES, We Can Do It at School!: <https://www.nctm.org/online-learning/Webinars/Details/371>
- Using Math to Make Sense of Our World: Pandemics, Viruses, and Our Actions: <https://www.nctm.org/online-learning/Webinars/Details/349>
- Digital Classroom Resources: Search for Statistics, Data, Data Science, Data Literacy: <https://www.nctm.org/classroomresources/>

REFERENCES & RESOURCES

Youcubed Data Science (Presenter: Jo Boaler | Contact: contact@bootstrapworld.org)

- Website: <https://www.youcubed.org/>
- Teacher Online Course: <https://www.youcubed.org/21st-century-teaching-and-learning/>
- High School Data Science Course: <https://www.youcubed.org/resource/high-school-data-science-course/>
- Data Science K-12 Lesson Plans: <https://www.youcubed.org/data-science-lessons/>
- Data Talks: <https://www.youcubed.org/data-science-lessons/>
- Data Big Ideas (K-10): <https://www.youcubed.org/data-big-ideas/>

Introduction to Data Science (Presenter: Suyen Machado | Contact: info@idsucla.org)

- Website: <https://www.introdatascience.org>
- Program Overview: <https://www.introdatascience.org/introduction-to-data-science-curriculum>
- Partnering with IDS: <https://www.introdatascience.org/introduction-to-data-science-partnership>
- Research & Publications: <https://www.introdatascience.org/news-publications-and-presentations>

REFERENCES & RESOURCES

Bootstrap Data Science (Presenter: Emmanuel Schanzer | Contact: contact@bootstrapworld.org)

- Website: <https://www.BootstrapWorld.org>
- DS materials: <https://www.bootstrapworld.org/materials/data-science/>
(Elementary grade materials are available upon *request*, but not yet linked publicly)
- Published research: www.BootstrapWorld.org/impact
- Work on accessibility:
<https://cs.brown.edu/~sk/Publications/Papers/Published/sbk-adap-stud-ide-blind-prog/>
<https://cs.brown.edu/~sk/Publications/Papers/Published/sbk-accessible-ast-blocks/>
- “4 ingredients of K12 Data Science” position paper:
<https://bootstrapworld.org/blog/curriculum/Four-Ingredients-of-Data-Science-Education.shtml>
- A sneak peak at our upcoming paper on the role of Domain Investment in K12 Data Science
<https://bootstrapworld.org/blog/curriculum/Data-Science-Student-Experience.shtml>

REFERENCES & RESOURCES

Federal Funding Resources (Presenter: Zarek Drozda | Contact: zarek.drozda@ed.gov)

- ARP ESSER Funds FAQ Guidance (May 2021): https://oese.ed.gov/files/2021/05/ESSER.GEER_.FAQs_5.26.21_745AM_FINALb0cd6833f6f46e03ba2d97d30af953260028045f9ef3b18ea602db4b32b1d99.pdf
- Teacher Quality Partnerships (TQP): <https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/effective-educator-development-programs/teacher-quality-partnership/about-us/>
- Supporting Effective Educator Development (SEED): <https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/effective-educator-development-programs/supporting-effective-educator-development-grant-program/us-supporting-effective-educator-development/>
- Education Innovation Research (EIR): <https://oese.ed.gov/offices/office-of-discretionary-grants-support-services/innovation-early-learning/education-innovation-and-research-eir/>
- Education Research Grant Program (ERG): https://ies.ed.gov/funding/ncer_progs.asp
- OET Education Technology Grants Hub: <https://tech.ed.gov/funding/>
- FCC E-Rate: <https://www.usac.org/e-rate/>
- FCC Emergency Connectivity Fund: <https://www.fcc.gov/emergency-connectivity-fund-faqs>
- NSF Harnessing the Data Revolution: <https://www.nsf.gov/cise/harnessingdata/>
- NSF Division of Research and Learning: <https://www.nsf.gov/div/index.jsp?div=DRL>



QUESTIONS FOR ED?

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