

Leveraging Authentic Data Across STEM Curricula

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Watch the recording of this webinar: <https://multiplex.videohall.com/pages/september2020webinar>

Join the online discussion: https://multiplex.videohall.com/month_themes/8/discuss

Webinar Chat and Resources Mentioned During Webinar

Resources

Articles and Papers

- [Learning to Reason with Data: How Did We Get Here and What Do We Know?](#) Andee Rubin
- [Messy Data, Real Science](#), Amy Hammett and Chad Dorsey
- [Data Use in the Next Generation Science Standards \(revised edition\)](#), Kim Kastens, Oceans of Data Institute
- [International Handbook of Research in Statistics Education](#), Editors: D. Ben-Zvi, K. Makar, J. Garfield
- [What's Going On in This Graph? | Easing Lockdowns](#), The Learning Network, NY Times
- [From Data Collectors to Data Producers: Shifting Students' Relationship to Data](#), L.Hardy, C. Dixon, S. Hsi
- [From Data Collectors to Data Producers](#), Concord Consortium

Tools and Activities

- [CODAP](#), free educational software for data analysis
- [Tuva](#) tools enable students to easily explore and manipulate data to create their own graphs and charts
- [Oceans of Data](#) has compiled a list of data activities, lessons, and resources for the classroom, sorted by grade level
- [Data Jam](#), Data sets
- [Mobilize](#), Web tools
- [Everyday Inquiry with R](#)

Professional Development

- [Examining How Online Professional Development Impacts Teachers' Beliefs About Teaching Statistics](#), Hollylynne S. Lee, Gemma F. Mojica, Jennifer N. Lovett
- [Introduction to Data Science](#), leading national provider of high school data science education materials, professional development, and technological support.
- [Supports for Improving Practice](#), collection of resources (videos, articles, activities, and websites) that can be used to support teachers in improving their practices related to teaching statistics through data investigations.
- [InSTEP](#): Invigorating Statistics Teacher Education Through Professional Online Learning

Projects

- [Strengthening Data Literacy across the Curriculum \(SDLC\) Project](#), developing & studying high school curriculum modules that integrate social justice topics with statistical data investigations to promote skills and interest in data science among underrepresented groups in STEM. (Josephine Louie, PI)
- [Analyzing & Interpreting Data Across STEM Disciplines](#), 16 DRK-12 projects that are building students' data skills through research and innovative curriculum and tools.
- [Computing with R for Mathematical Modeling \(or CodeR4MATH\)](#) provides a robust path for integrating math and computing learning

Event

- September 24 at 8PM ET, NSTA will be hosting a Twitter chat (#NSTAchat) on the topic of [data in the science classroom](#).

Don't forget to check out the [Theme of the Month Resources](#) as well as the [Video Playlist!](#)

Webinar Chat

Christine B: Hello! I'm Christine Bean, Rutgers University 4-H Youth Development

Margo Murphy: Maine is well represented. Hi everyone!

John U: Hi John Underwood from Baton Rouge, LA

Leana Nordstrom: Hi everyone! Leana from CADRE (<http://cadrek12.org>) here.

Karina P: Hi all, Karina Peggau from Ohio State University

Amy Busey: Welcome and hello, everyone! Amy Busey, EDC via Brooklyn, NY. Also from CADRE.

Craig H: Hi I'm Craig Hood, Loyola New Orleans, in the Big Easy

Shiyan J: Hi Shiyan from NC State, NC

Stephanie H: Hi Stephanie Harmon from Mount Vernon, KY

Hamid S: NCSU!

Ashley R: Hello I'm Ashley Rasmussen Science Curriculum Specialist from Nebraska

Michael J: Mike Jabot from Fredonia, NY

Annette B: Annette Brickley from Mattapoisett, MA, representing NES-LTER in Woods Hole

Gemma M: Hi, Gemma Mojica — also from NC State

Elizabeth S: Liz Schultheis, Data Nuggets, Michigan State University

Betsy S: hi, I'm Betsy Stefany from New Hampshire

Christine F: Hi everyone, I am Christine Franklin from American Statistical Association.

Sam D: Sam Donovan - University of Pittsburgh (Biology) and QUBES (qubeshub.org)

Teki H: Hello. I am Teki Hunt from the University of Arkansas at Pine Bluff 4-H program.

Kristin J: Kristin Jenkins from BioQUEST in Maryland.

Marlon F: Hello all, I am Marlon Francis, from Louisville, KY

Sarah H: Hi, Sarah Hooper, Education Specialist from Schoodic Institute at Acadia National Park, ME

Kristin H: Hi everyone, Kristin from Dataspire Education & Evaluation in New Jersey

Janice M: Janice McDonnell, Rutgers University

Chad J: Chad Janowski, Einstein Project, Green Bay, WI

Donna Z: Donna Ziegenfuss from University of Utah - Hello from Salt Lake City

Jenn P: Jenn Page, Director of Education, Hurricane island center for science and leadership, Maine

Jo L: Jo Louie, EDC

Xavier R: Hi all, Xavier Rozas of the EQUiPD Program out of the University of Florida

Cliff F: Cliff Freeman, Boston MA - The Young People's Project & Boston University

Laurie S: Hi, Laurie Salvail, from CYBER.ORG, Bossier City, Louisiana

Joan H: Hi, I am Joan Harper-Neely from NASA eClips.

Suzanne K: Suzanne Kirk, Virginia Commonwealth University

Melissa M: Melissa McCutcheon, from New Jersey, work at TransOptions sustainable transportation nonprofit

Sarah C: Sarah Carter, Minnesota Department of Education

Brittany P: Hi everyone from Bossier, LA!

Michael D: Michael Daley, University of Rochester

Ateng' O: Am Ateng' Ogwel, from Nairobi Kenya

Holly M: Holly Morin, Inner Space Center Education Programs Leader, University of Rhode Island

Beth B: Hello, I'm Beth Byerssmall from the Maine Center for Research in STEM Education. I work with an NSF Teaching Fellowship Program funded by Noyce.

Molly S: Molly Schauffler, Partners in Data Literacy, UMaine and Tuva

Hollylynn L: Hello! Hollylynn Lee from NC State and the Hub for Innovation and Research in Statistics Education

Lauren J: Lauren Johnson, elementary STEM Teacher at Booker T. Washington STEM Academy in Champaign, IL

Leana Nordstrom: There are many more video examples on the Multiplex, these are just a few great examples of projects leveraging authentic data in STEM Curricula.

Jamie B: Jamie Bell, Project Director of CAISE, the NSF AISL-funded resource center.

Cindy Z: Hello All, I am Cindy Ziker, Executive Director of Ziker Research here in San Jose California.

Leigh P: hey all! Leigh Peake, Gulf of Maine Research Institute in Maine

Larisa S: Greetings from the Global STEM Education Center, Inc and @GlobalSTEMClass

Kevin P: Hello! Kevin Pelaez from San Diego

Larisa S: Where would be able to find the recordings? Thanks!

Kim Descoteaux: The recording will be posted tomorrow here-
https://multiplex.videohall.com/month_themes/8

Larisa S: Thank you, Kim!

Craig H: Availability of Big Databases and Cloud storage and computing

Kim Descoteaux: Please feel free to post any questions to the panelists here in this chat. If you have any good resources you'd like to share, post those as well!

Amy Busey: From the Multiplex Resource List - Learning to reason with data: How did we get here and what do we know? https://s3.amazonaws.com/videohall-prod/7bb1e48a587657996a02f94cfc23c305/system/comfy/cms/files/files/000/000/259/original/Rubin-Commentary_paper_for_JLS_Special_Issue_FINALsinglespace.pdf

Betsy S: Could you discuss the integration of visualization systems with data?

Craig H: @Betsy YES, important. A good Dashboard tool (think John's Hopkins COVID) is powerful

Betsy S: Craig, thank you.

Todd C: How can we in STEM ed think about intentionally engaging students in justice-centered STEM pedagogy with data science that centers equity/justice alongside authentic forms of STEM disciplinary engagement/pursuits, even when STEM disciplines have not historically been very good at this?

Leana Nordstrom: I think we'll get into discussion about platforms and visualization systems further into the webinar. If not, we'll loop back to this when we pause for questions. Thanks for raising this!

Shiyan J: Hi Suyen, you mentioned computational tools for learning about data, could you discuss more about what we can do more to support learning with data using computational tools? Thank you.

Amy Busey: Also from the Multiplex Resource List - Messy Data, Real Science (includes tips and examples for creating experiences for learning with and about data): <https://concord.org/wp-content/uploads/publications/messy-data-real-science.pdf>

Hollylynne L: Andee---I think that is really important in the era of big data when so much data is available...helping students interrogate data enough so they know if a question can be answered with given data

Leana Nordstrom: Todd, you may be interested in Jo Louie's work: <http://cadrek12.org/projects/strengthening-data-literacy-across-curriculum-sdlc>

Kevin P: I really appreciate Todd's question! There's a great opportunity to include justice-centered pedagogies to use data to understand, identify, and challenge social inequities

Craig H: On Assessment, would use of "un-grading" or "specifications" grading be appropriate?

Hollylynne L: Margo---by a framework, do you mean a framework that might illuminate levels of sophistication across different data investigation aspects???

Leigh P: Nice piece from Kim Kastens and ODI on data use in the NGSS. Loads of crossover.

Leigh P: <http://oceansofdata.org/our-work/data-next-generation-science-standards>

Colin E: Q for the panel that builds on Todd's --- what is your vision of the role of engaged ethics in both generating and working with K-12 data science. I'm thinking about this in conjunction with the growing critiques of surveillance technologies and social media.

Hollylynne L: I second that piece! I actually have done a similar analysis of how the data practitioner career profile matches with AP statistics standards

Hollylynne L: <https://www.springer.com/gp/book/9783319661933>

Hollylynne L: Link to Handbook

Jean M: Agree with Chad's reference to "flat" data - this challenge is drawing us to focus on visualizations - especially satellite imagery, over time, in which pattern recognition because a great entry point.

Craig H: Citizen Science folks have to deal with surveillance issues because they often use images collected from the public space.

Jean M: Whoops - becomes a great entry pt.

Shiyan J: <https://www.nytimes.com/2020/05/14/learning/whats-going-on-in-this-graph-easing-lockdowns.html>

Todd C: Thanks Leana for this resource! And, thanks Kevin. It seems that we can't continue to just hope that inequities/justice rises to the center of our focus in classrooms and data science seems REALLY important for supporting intentional focus in this area.

Joan H: Teachers are still learning about inquiry-bases

Leana Nordstrom: Speaking of tools, there are examples in the resources of the Multiplex. https://multiplex.videohall.com/month_themes/8#resources and you can explore NSF-funded research and innovative curriculum & tools that are building students' data skills in this Spotlight-- <http://cadrek12.org/analyzing-interpreting-data-across-stem-disciplines>

Amy Busey: CODAP: <https://codap.concord.org>

Amy Busey: TUVAlabs: <https://tuvalabs.com>

Nada M: To create authentic classrooms for students, do you think Art can play an important role in STEM, without losing the focus on STEM subjects? I think it may lead to deeper learning!

Leana Nordstrom: ODI compiled a list of data activities, lessons, and resources for the classroom, sorted by grade level: <http://oceansofdata.org/our-work/teacher-resources>

Hollylynne L: Completely agree about teachers engaging and struggling with data themselves!

Kara H: ^^

Joan H: Teachers are still learning about inquiry-based lessons where students are doing more active learning. How can we help teachers see the value in taking the time to do inquiry-based lessons where students collect their own data?

Sandy M: Me too, Hollylynne!

Cristián R: In order to integrate data science into the curriculum, we need to involve teachers, technologists, programmers, scientists and curriculum developers. I think Concord and Ocean's Data already have a model for that collaboration.

Hollylynne L: From the MOOCs that we developed on Teaching stats with data, we have a small collection of resources from that course that can be useful in professional development. https://hirise.fi.ncsu.edu/resources-2/tsdi_resources

Annette B: Who were those authors Chad mentioned?

Leigh P: Colin Dixon, Sherry Shi ...

Cristián R: Could you talk a little bit of how that collaboration works?

Amy Busey: From Data Collectors to Data Producers: <https://www.tandfonline.com/doi/abs/10.1080/10508406.2019.1678164?journalCode=hlns20>

Carolyn S: and Lisa Hardy

Carolyn S: From data collectors to data producers - <https://concord.org/blog/from-data-collectors-to-data-producers/>

Cristián R: Thanks Carolyn!

Jo L: Hats off to Christine Franklin, a primary author of the GAISE report for K-12, for emphasizing the data investigation cycle!

Andee Rubin: And Chris is on the call!

Hollylynne L: And GAISE II will be released soon!

Suyen M: <https://www.idsucla.org>

Chad Dorsey: I can't wait! GAISE is the best.

Suyen Machado: Yay! GAISE II.

Craig H: On Professional Development ... is it TRAINING or TIME or MONEY ?

Craig H: That is, Program training

Kevin W: "Unmasking".... Pun intended?

Hollylynne L: We know that online teacher professional development can WORK to help teachers shift their perspectives and change their practices (self-reported anyway) see <https://olj.onlinelearningconsortium.org/index.php/olj/article/view/1992>

Hollylynne L: Coalition of Messy Data!

Hollylynne L: Suyen---does your PD only target those implementing the IDS curriculum, or also work with math teachers more broadly?

Kim Descoteaux: Don't forget to visit <https://multiplex.videohall.com> to post to the month-long discussion, read the blog and view the resources.

Ateng' O: Listening to the amazing reflections and insights. In Kenya, we may not be there yet, at the K-12 equivalent, but issues of data literacy are fundamental for everyone.

Gemma M: Thanks so much to the panelists. It is so great to hear your perspectives. It was very reaffirming to hear your insights and very invigorating. I appreciated all the different perspectives and resources.

Suyen Machado: @Hollylynne Starting this spring, we are going broad. It's been IDS until now.

Christine F: We are excited about the soon to be released updated Pre-K-12 GAISE II - same spirit of GAISE I but now including the data science realm for K-12!

Ateng' O: @Suyen talked of using R-programming, is it for K-12 or college students?

Annette B: As an educator working to do outreach for scientists, what are some key points you offer make the project data interesting to students and teachers? (access, I can handle, but I would love more teacher buy-in to <https://sites.google.com/view/nes-lter-schoolyard-datajam/data-jam-data-sets>

Craig H: College students can barely learn R, so I imagine it's not K-12

Andee Rubin: IDS is a high school course and they use R-Studio.

Cristián R: Hi @ateng, take a look at this link: <https://concord.org/our-work/research-projects/computing-with-r/>

Leana Nordstrom: Slightly off the current topic, but we wanted to make sure to share this upcoming event that some of you may be interested in: On September 24 at 8PM ET, NSTA will be hosting a Twitter chat (#NSTAchat) on the topic of data in the science classroom. All are welcome to participate and/or listen in: https://twitter.com/hashtag/NSTAchat?src=hashtag_click&f=live

Ateng' O: Could @Chad also give more insights in the text as data, is it in any way about natural language processing?

Hollylynn L: As for PD efforts, our team at NC State is building an innovative platform for teachers to learn to teach stats and data where they will be able to personalize their learning! Would love to hear from anyone really interested in online PD in helping teachers think about teaching data investigations. <https://hirise.fi.ncsu.edu/projects/instep/>

Suyen Machado: To see how IDS students work with RStudio, visit: <https://sandbox.mobilizingcs.org/>

Todd C: Need to leave now . . . thanks for a great session (Panelists and all)!

Carolyn S: R- programming also is free. Jai Chao - <https://concord.org/blog/everyday-inquiry-with-r-is-yogurt-x-expensive/>

Leigh P: The addition of those plug-ins to CODAP is terrific

Kim Descoteaux: Don't forget to visit <https://multiplex.videohall.com> to post to the month-long discussion, read the blog and view the resources.

Leigh P: Thanks to Randy & panelists & Jo for a great session!

Craig H: Thanks @Suyen !

Alan B: This has been a wonderful panel ... thanks everyone

Kristin H: Thank you everyone this was fantastic!

Leana Nordstrom: Let's move these questions to the discussion forum!

https://multiplex.videohall.com/month_themes/8/discuss

Sandy M: Thanks everyone!

Ateng' O: I had a quick look at CODAP and found it extremely useful. Students would work with different visualizations.

Christine F: Thank you panelists - excellent!

Hollylynne L: You all do AMAZING work!

Shiyan J: Thank you panelists!

Kim Descoteaux: Don't forget to [visit https://multiplex.videohall.com](https://multiplex.videohall.com) to post to the month-long discussion, read the blog and view the resources

Carolyn S: Can we also have a copy of the Chat since so many links in the Chat that we could investigate?

Hollylynne L: Data dynamos!

Kim Descoteaux: <https://multiplex.videohall.com>

Leana Nordstrom: We realize we couldn't get to most of your questions, so please do ask your burning questions at the discussion forum and we will try to respond there:

https://multiplex.videohall.com/month_themes/8/discuss

Craig H: Thanks ALL!

Laurie S: Thank you all so much!!!

Amy Busey: Thank you to the panelists and to everyone for coming!

Leana Nordstrom: Both the chat and recording will be shared. Thank you all for a great chat discussion

Randy Kochevar: Thank you all for joining us!

Ateng' O: Thanks so much for the awesome meeting

Sarah H: Thank you, for a rich discussion.

Steven M: Anyone can save the chat through the three-dot menu where you type your comment

Jamie B: Thank you, All!

Betsy S: Thank you and will be excited to read more in the discussions.

Carolyn S: Saved the Chat. thanks

Sarah C: Thanks!

Ashley P: Thank you!

Kim Descoteaux: I believe so but we will also be posting a cleaned up version of the chat at <https://multiplex.videohall.com>

Nada M: Thank you! Great session!

Cristián R: Thank you!!

Christine B: Thank you for this great resource and ongoing discussion