

ITEST Data Jam 2024–25

Teacher Focus Group Report

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Abstract

This report presents findings from teacher focus groups conducted following the 2024–25 implementation of the Luquillo Data Jam, an educational initiative of the Luquillo Long-Term Ecological Research (LTER) Schoolyard program. The Data Jam engages more than 600 middle and high school students across Puerto Rico in authentic data science practices using real ecological datasets. Focus groups addressed two core research questions: what professional development support teachers need to guide students through scientific question formulation and data analysis, and what scaffolding strategies help students develop data-driven research questions and data science skills.

Findings are organized across five program components: the summer professional development workshop, Virtual Lab Meetings (VLMs), classroom implementation, the Data Jam website, and the final project and symposium. Teachers consistently valued the workshop's active learning approach, the benefits of interdisciplinary science–math collaboration, scientific mentor support, and the bilingual datajam.cloud website. Mentor feedback on student poster drafts was identified as a particularly high-impact program element.

Teacher recommendations prioritize better curriculum alignment, more flexible challenge scheduling, earlier delivery of instructional materials, and expanded feedback mechanisms. These findings offer a practical roadmap for strengthening the Data Jam model as a leading example of authentic STEM education in Puerto Rico.

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Program Synopsis: The Luquillo Data Jam

The Luquillo Data Jam is an educational initiative of the Luquillo Long-Term Ecological Research (LTER) Schoolyard program. It engages middle and high school students across Puerto Rico in authentic data science practices using real ecological datasets generated by the Luquillo LTER program. The program was first developed at the Jornada Basin LTER in 2012 and was adopted by the Luquillo LTER in 2015. In the 2024–2025 school year, more than 600 students participated, culminating in a January 2025 research symposium at the El Yunque National Forest El Portal visitor center where 156 students presented 46 data-driven projects.

Core Program Components

The focus groups addressed five interconnected elements of the Data Jam program, all of which are summarized below.

1. Summer Professional Development Workshop

Teachers participated in a weeklong (30-hour) summer workshop designed around active learning. Rather than receiving passive instruction, teachers adopted a “student hat” approach—experiencing every Data Jam activity as a student would before adapting it for their own classrooms. The workshop deliberately brought together science and mathematics teachers from the same schools to foster interdisciplinary collaboration. LTER scientists served as mentors, presenting their research trajectories and providing feedback on teachers’ mini Data Jam projects.

2. Challenges and Virtual Lab Meetings (VLMs)

From September through November, students completed three online formative challenge tasks—one per month—each containing an investigation question, background information, and a linked CODAP dataset. Student responses were collected by the Data Jam team, and a random sample was reviewed by teachers during cross-school Virtual Lab Meetings (VLMs). The first VLM ran for 120 minutes to provide time for introductions. The subsequent two VLMs were 90 minutes. In each VLM there were 60 minutes of examining students work collaboratively following a validated protocol, and the final 30 minutes provided unstructured time for teachers to ask mentors questions about statistical concepts, data interpretation, and implementation. Teachers could complete a support ticket ahead of the meeting to give mentors time to prepare responses, resources, or clarify questions.

3. Data Jam Implementation in the Classroom

Teachers implemented Data Jam activities throughout the fall semester, integrating science and math content through shared datasets derived from Puerto Rico ecological research. Four primary datasets—on freshwater shrimp, coquí, Odonata (dragonflies), and hydrology—anchored student investigations. Students learned to characterize data distributions using box plots, compare categorical data with percentages, explore numerical relationships via scatterplots, and analyze trends through time series graphs.

4. Data Jam Website (datajam.cloud)

The bilingual Data Jam website (<https://datajam.cloud>) provided teachers and students with access to student-friendly versions of long-term LTER datasets, metadata, background information documents, and lesson plans. All datasets are available in English and Spanish. The site provides teachers direct access to curated datasets and the CODAP tool from a single, organized location.

5. Final Project and Symposium

Data Jam culminates with students developing independent research projects using the master datasets, guided by their own scientific questions. Teachers select the strongest student projects for presentation at the annual Data Jam Symposium, where students present posters to peers, family members, educators, undergraduate and graduate students, and Luquillo LTER scientists. Prior to the symposium, science mentors provide direct feedback on student poster drafts. The entire process—from formulating questions to public presentation—positions students as junior members of a scientific community of practice.

6. Scientific Mentors

There were 11 scientific mentors, who were a combination of Luquillo-affiliated or NEON-affiliated graduate students and faculty members. The mentors played a multifaceted role throughout the Data Jam program, serving as scientific experts and feedback providers at multiple stages of the program. During the summer workshop, LTER scientists presented their own research trajectories and provided hands-on guidance as teachers worked through mini Data Jam projects, helping to ground the program in authentic science from the outset. During the school year, mentors led the support section of the VLMS, fielding teacher questions about statistical concepts, data interpretation, and implementation challenges. The mentors gave presentations about their own research trajectory to the students of their teacher mentees. Mentors also provided direct written feedback on student poster drafts ahead of the symposium, helping teachers identify which projects were most complete and guiding students in refining their work before public presentation. Across these roles, mentors functioned as a bridge between the scientific community of the Luquillo LTER and the K–12 classroom, making authentic ecological research accessible and actionable for both teachers and students.

Focus Group Findings

Focus groups were conducted with both novice and veteran Data Jam teachers following the 2024-25 implementation. The focus groups addressed two core research questions: (RQ1) what professional development support teachers need to guide students through scientific question formulation and data analysis; and (RQ2) what scaffolding experiences teachers can provide to help students develop data-driven research questions and appropriate data science skills. The following sections present key findings organized by program component, incorporating direct teacher voices in both Spanish and English.

1. Summer Professional Development Workshop

Active Learning Strategies

The most consistently cited benefit of the summer workshop was its use of active, experiential learning. By placing teachers in the role of students—navigating the same datasets, challenges, and tools their own students would later encounter—the workshop produced a deeper understanding of both the content and the learner experience. This approach allowed teachers to anticipate student challenges and prepare responses in advance.

Spanish / Español	English / Inglés
No solamente era teoría, sino hacíamos las cosas nosotros mismos, veíamos de esto,	It wasn't just theory; we did things ourselves; we saw things, we went through the whole experience

pasábamos por toda la experiencia de que el estudiante debe haber pasado. Y ahí nos surgían las preguntas que el estudiante posiblemente también iba a tener, que ya con nuestra experiencia pudimos contestarle a ellos.

the student must have gone through. And then we came up with questions the student might also have, which, with our experience, we were able to answer for them.

Interdisciplinary Collaboration

Having science and mathematics teachers participate together in the workshop was viewed as especially beneficial. Teachers recognized that the statistical and scientific dimensions of Data Jam are inseparable, and that working alongside a colleague from a complementary discipline increased their confidence, validated their practice, and improved the quality of their shared work.

Spanish / Español

Primero, se vio ahí la integración en su máximo esplendor. Ahí pudimos ver que las matemáticas y las ciencias están completamente conectadas, que no las podemos aislar. Ellas van una de la otra, van tomaditas de la mano. Y como te expliqué al yo estar relacionada con la maestra de ciencias, que ya, pues, domina unas áreas, unos campos que yo no domino tanto como ella, y entonces, el poder compartir juntos, pues nos ayudó a poder realizar mejor el trabajo. Muy beneficioso.

English / Inglés

First, we saw integration at its finest. We saw that math and science are completely connected, that we can't isolate them. They go hand in hand, one after the other. And as I explained, since I'm working alongside the science teacher, who already has command of some areas and fields that I don't have as much command of as she does, being able to share together helped us do our work better. Very beneficial.

Workshop Organization and Materials

Teachers valued the structured organization of the workshop and the quality of materials provided, including presentations, worksheets, and step-by-step activity guides. The introduction of CODAP as a new analytical tool was a highlight, though some teachers noted an initial learning curve that also appeared later in their classrooms.

Spanish / Español

Para mí fue valioso el taller de verano, las herramientas que nos dieron, ¿verdad?, para poder aplicar en la sala de clases, entiéndase las presentaciones, los worksheets, ¿verdad?, las hojas que nos dieron para hacer las tareas allí durante el proceso y las explicaciones, como, ¿verdad?, fueron explicando cada actividad.

English / Inglés

For me, the summer workshop was valuable, the tools they gave us, right?, to be able to apply in the classroom—meaning the presentations, the worksheets, the sheets they gave us to do the assignments during the process, and the explanations as they went through each activity.

Spanish / Español

Sí. En mi caso, el conocer la herramienta de las bases de datos y poder aplicarlas.

English / Inglés

Yes. In my case, it was knowing the database tool and being able to apply it.

Recommendations

- Deepen instruction in statistical concepts, particularly for teachers of 11th and 12th grade students.
- Reduce the number of activities packed into the workshop week to allow teachers more time to process and internalize each component.
- Provide a written implementation booklet with detailed step-by-step instructions for each classroom activity, serving as a reference guide teachers can consult after the workshop ends.

2. Challenges and Virtual Lab Meetings (VLMs)

Student Work Protocol

Teachers found the VLM format for reviewing student work—with challenge responses displayed side-by-side in structured tables—significantly more useful than reviewing raw Excel exports from Google Drive. The structured presentation allowed teachers to compare responses, identify patterns in student understanding, and engage more meaningfully in discussion with their peers.

Spanish / Español

De verdad que cuando iba a evaluar el proceso, después de que ellos enviaban su respuesta a los retos, se me hacía bien difícil. Que me hubiera gustado quizás poder ver las contestaciones de mis estudiantes de la misma manera que veía las contestaciones en la reunión virtual y con los nombres de ellos para poderle dar mi feedback a los estudiantes sobre sus respuestas individualmente.

English / Inglés

Truthfully, when I went to evaluate the process after they sent their responses to the challenges, it was very difficult for me. I wish I could have seen my students' answers in the same way I saw them during the virtual meeting, with their names, so I could give them feedback on their responses individually.

Teachers also valued the opportunity to hear how their colleagues interpreted and critiqued student work. This peer learning dimension of the protocol helped teachers refine their own feedback practices.

Spanish / Español

A mí me gustó escuchar la manera en que otras personas criticaban diferentes tipos de trabajos. Me ayudaba a ver dónde yo tenía que corregir a los míos, por dónde yo tenía que observar más.

English / Inglés

I liked hearing how other people critiqued different types of work. It helped me see where I needed to correct mine, and where I needed to observe more carefully.

Mentor–Teacher Interaction

For teachers who actively used the support ticket mechanism to direct questions to their scientific mentors, the experience was highly valuable. Mentors helped clarify statistical concepts, offered alternative explanations, and validated teachers' instructional approaches. However, some math

teachers expressed that a scientist mentor was less helpful for addressing specifically mathematical questions.

Spanish / Español

Sí, Fue de gran ayuda porque había veces que nosotros lo entendíamos de una forma y la mentora, que fue Carla, pues nos explicó, ¿verdad? Que podíamos verlo de otra forma y se me hizo más fácil la forma como ella nos explicaba y como nosotros podíamos explicárselo a los estudiantes.

English / Inglés

Yes, it was of great help because there were times when we understood it one way, and the mentor, Carla, explained to us that we could see it another way, and it made it easier—both the way she explained it to us and how we could then explain it to the students.

Spanish / Español

Para mí, mi experiencia con el mentor fue excelente, valiosa, nos ayudaba mucho en cuestión de que podíamos reforzar. Realmente su trabajo fue excelente.

English / Inglés

For me, my experience with the mentor was excellent, valuable. It helped us a great deal in terms of reinforcement. His work was truly excellent.

Recommendations

- Create a visualization format for all of the challenge responses with the format used during VLMs, giving teachers consistent access to clearly presented student responses.
- Redesign the support ticket so that students—not teachers—submit questions directly and integrate the ticket into the challenge itself so mentors can see student doubts in real time.
- Consider including a math-specialist mentor or co-mentor to better support mathematics teachers' discipline-specific questions.

3. Data Jam Implementation in the Classroom

Administrative Support

Teachers reported that principal support was a meaningful factor in successful implementation. Supportive principals provided flexibility for curriculum integration, identified and secured needed equipment, and communicated trust in the teachers' professional judgment. While principals did not typically participate directly in instruction, their structural support created conditions for effective classroom implementation.

Spanish / Español

Bueno, en mi caso, el director pues nos apoyó en todo momento. Nos buscó la computadora, se la dejó a la mesa de matemáticas. O sea, en todo lo que necesitábamos estuvo, él estuvo presente. Nos apoyó mucho.

English / Inglés

Well, in my case, the principal supported us at all times. He found a computer for us and left it at the math table. In everything we needed, he was there. He supported us a lot.

Spanish / Español

Me dio la libertad de cambiar ese currículo para adoptar a Data Jam, el cual, perfecto, muy bien y todo, pero es que estaba tomando demasiado tiempo durante todo el semestre.

English / Inglés

She gave me the freedom to change that curriculum to adapt to Data Jam, which was perfect, very good and all, but it was taking too much time throughout the semester.

Science–Math Teacher Collaboration

Co-teaching between science and mathematics teachers emerged as one of the most consistently positive aspects of classroom implementation. Paired teachers divided instructional responsibilities by subject expertise, maintained open communication throughout the semester, and modeled collaborative problem-solving for their students. This teamwork also strengthened students' sense of support—knowing they could seek help from either teacher.

Spanish / Español

Nosotros tratamos de seguir el calendario que se había establecido en verano. Tratamos de seguirlo lo más fiel posible y mantuvimos muchísima comunicación. Y como te comenté, yo decía, ¿verdad?, [a mi compañero], “tú vas a explicar lo de ciencia, porque esa es tu especialidad, y yo explico lo de matemática, que es mi especialidad”.

English / Inglés

We tried to follow the calendar established in summer. We tried to stick to it as faithfully as possible and maintained a lot of communication. And as I mentioned, I said [to my colleague], ‘you will explain the science part because that’s your specialty, and I will explain the math part because that’s mine.’

Spanish / Español

Y yo creo que los estudiantes también lo percibieron, porque entonces si yo faltaba, pues buscaban ayuda en ella o si ella faltaba, buscaban ayuda conmigo, o a veces cuando estábamos en el rush de los retos, ellos preguntaban, ‘mrs., ¿yo puedo ayudar?’ Y nos reunimos todos en un solo salón.

English / Inglés

And I think students also perceived it, because if I was absent they would seek help from her, or if she was absent, they sought help from me. Sometimes when we were rushing through challenges, they asked, ‘Mrs., can I help?’ And we would all gather in one classroom.

Transition to Implementation and Curriculum Fit

As students completed successive challenges, their confidence and agility with data analysis grew progressively. Teachers noted that the learning curve was steep at first but became more manageable over time. Nonetheless, several teachers described tension between the Data Jam timeline and the demands of the broader school curriculum. Some also noted that instructional materials and PowerPoint presentations were not always available at the start of the school year, requiring teachers to develop their own resources temporarily.

Spanish / Español

A medida que fueron pasando los retos, como que le fuimos cogiendo el piso y entonces, pero

English / Inglés

As the challenges went by, we kind of got the hang of it. At first it was tough. But once they started to

en un principio fue alto. Entonces, una vez ellos empezaron a entender la plataforma y empezaron a identificar los datos y todo eso, pues entonces se fue haciendo más llevadero el proceso.

understand the platform and began identifying the data and all that, the process became more manageable.

Spanish / Español

Ese tema yo no lo puedo tener todo el semestre hasta enero. O sea, yo no puedo arrastrar ese tema. Este, ya fui para otro capítulo, ya seguí y no puedo seguir alargando el chicle, como uno dice.

English / Inglés

I can't have that topic all semester until January. I can't drag it out. I've already moved to another chapter, and I can't keep stretching it, as one says.

Teachers also found that supplementary technology tools—particularly Microsoft Teams—facilitated communication and organization between teachers and students from the same schools throughout implementation.

Spanish / Español

En nuestro caso nosotros creamos un Teams, y en el Teams poníamos toda la información de Data Jam. Ahí estaban nuestros estudiantes, ambas veíamos lo que todos hacían, así que estábamos constantemente—yo estaba viendo lo que ella estaba haciendo en ciencia y ella estaba viendo lo que yo estaba haciendo en matemática.

English / Inglés

In our case, we created a Teams channel and put all the Data Jam information there. Our students were in it. We both saw what everyone was doing—I was seeing what she was doing in science, and she was seeing what I was doing in math.

Recommendations

- Provide all instructional presentations and materials before the school year begins so teachers can begin implementation without delays.
- Develop a step-by-step teacher implementation guide that maps Data Jam activities onto the school curriculum calendar.
- Create a checklist-based feedback tool that allows teachers to quickly identify areas for student improvement, with recommended mentor commentary included.
- Increase flexibility in challenge due dates, allowing teachers to open challenges two to three weeks in advance and close them at a date that aligns with their instructional sequence.
- Provide additional instructional content specifically addressing mathematical concepts, particularly for math teachers who feel the current materials are more science oriented.
- Allow more spacing between the delivery of the math challenge and the science challenge to reduce the instructional burden in any given week.
- Expand opportunities for mentor feedback on student challenge responses, beyond the VLM setting.

4. Data Jam Website (datajam.cloud)

The Data Jam website received strongly positive responses from teachers in its inaugural year. Teachers highlighted the value of having all datasets, metadata, background information, and CODAP links in a single, accessible bilingual platform. Students, including those in special education, successfully navigated the site and often used it independently—even on the day before the symposium when reviewing their work.

Spanish / Español

Para mí, lo valioso de la página fue esa base de datos. La realidad es que ver todos esos datos de investigación y que los niños puedan trabajar la parte estadística, eso para mí fue como que, uh, ¡qué cool! Y, obviamente, también esa información de trasfondo, había tantos datos y tantas tantos detalles, dependiendo de hacia dónde nos íbamos dirigiendo en la investigación, había mucha información que ellos, pues, aunque podíamos buscar en otro lugar realmente lo teníamos ahí.

English / Inglés

For me, the valuable thing about the website was that database—the reality of it. Seeing all that research data and allowing the kids to work on the statistics—for me that was like, wow, how cool! And obviously that background information too. There was so much data and so much detail, depending on where we were heading in the research. There was a lot of information that, even though we could have found it elsewhere, we really had it right there.

Spanish / Español

Ellos, para usar la metadata, para acceder a CODAP, la utilizaron. Y a veces cuando tenían dudas de la metadata, pues ellos iban, buscaban términos... La manejaban bastante bien porque la plataforma es bastante friendly para los estudiantes... Por lo menos en mis estudiantes, que yo tengo la mayoría son de educación especial, que es un reto, que es un reto que se añade. Que ellos aprendieran a usar la plataforma—fue un reto, pero lo hicieron.

English / Inglés

They used the site to access the metadata and CODAP. When they had questions about the metadata, they would search for terms... They handled it quite well because the platform is very student-friendly... At least with my students, most of whom are in special education—that's an added challenge. But they learned to use the platform. It was a challenge, and they did it.

Recommendations

- Add short tutorial videos explaining how to navigate key sections of the website, particularly CODAP access, for teachers and students who learn better through visual demonstration.

5. Final Project and Symposium

Teachers used varied approaches to project selection. Veteran teachers typically had all students develop posters and then used mentor feedback to select the most complete projects for the symposium, ensuring that all students experienced the full research process. Novice teachers more often selected only the most engaged student groups for the final project. In both cases, mentor feedback on poster drafts was highly valued and viewed as a cornerstone of the final project process.

Spanish / Español

En mi caso, todos mis estudiantes hicieron posters. Se dividieron en grupos y ellos prepararon sus posters y después que yo se los envié y le pedí autorización, a Noelia los envié todos para que los evaluarán todos para que ellos pasaran por ese proceso, para que fuera justo para todos.

English / Inglés

In my case, all my students made posters. They divided into groups and prepared their posters. After sending them and requesting authorization, I sent them all to Noelia so they could all be evaluated, so every student could go through that process—so it would be fair for everyone.

Spanish / Español

Creo que por esa misma razón, lo mejor que fue en el feedback final para esos estudiantes que fueron a presentar, ese feedback del mentor, creo que eso es un aspecto que no deben cambiar, que debe ser ampliamente mejorado también tanto en el poster final, poster draft, con los arreglos del mentor, como en los retos.

English / Inglés

I think that for that very reason, the best thing was the final feedback for those students who came to present—that mentor feedback. I think that's an aspect that shouldn't change, that should be greatly improved as well—both in the final poster, the poster draft with the mentor's adjustments, and in the challenges.

Providing students with a broad list of research questions to choose from helped teachers support student agency and engagement during the final project phase, allowing students to pursue topics aligned with their own interests.

Spanish / Español

Pues, en el caso de los míos, que cuando yo les entregué las preguntas, había una gran variedad de preguntas que yo creo que acaparaban la diversidad de los intereses de ellos, así que ellos tuvieron la oportunidad de evaluar todas las preguntas y, entonces, poder decidir qué tema o en qué área se iba a basar su proyecto final.

English / Inglés

Well, in my case, when I handed out the questions, there was a wide variety that captured their diverse interests, so they had the opportunity to evaluate all the questions and decide what topic or area their final project would be based on. I think it was good for them to have that diversity and to be able to choose.

Recommendations

- Maintain and expand the mentor feedback process for final poster drafts, as teachers consistently identified it as one of the most valuable components of the program.
- Encourage all students to develop a project—even if only selected projects advance to the symposium—so that every student experiences the full Data Jam research arc.
- Continue providing a broad, diverse list of research questions to support student choice and motivation in the final project phase.

Conclusion

Across all five program components, teacher focus group participants expressed strong appreciation for the Data Jam model and its impact on both their own professional growth and their students' development as young scientists. The active learning design of the summer workshop, the collaborative science–math teacher structure, the mentored VLMs, the bilingual website, and the authentic final project experience together form a coherent, well-supported program that is making a meaningful difference in STEM education in Puerto Rico.

At the same time, teachers' recommendations reflect a genuine investment in the program's continuous improvement. Key priorities for the 2025–26 implementation include better alignment with the academic calendar and curriculum sequences, more flexible challenge scheduling, earlier delivery of instructional materials, enhanced feedback mechanisms for students, and continued strengthening of the mentor–teacher–student interaction. These refinements would deepen the program's already substantial impact and ensure that Data Jam remains a model of excellence for authentic science education.

The voices of Data Jam teachers—in both Spanish and English—reflect educators who are deeply committed to their students and to the practice of math and science. Their insights provide a valuable roadmap for the program's continued growth.