

Funding Futures: Exploring K-12 Education Finance Equity with R

Using the edfinr Package and the California Cradle-to-Career Student Pathways Dashboard

NOTE: A full repo with all files needed for this lesson – including slides and the R Markdown Lab Notebook - is available at:

<https://github.com/mlchrzan/Funding-Futures>

Course Title	Grade Level	Duration
Introduction to Education Policy & Data Science	Undergraduate (Freshmen/Sophomore)	75 Minutes

Materials / Resources	Target Audience
- Computers with R/RStudio (or Posit Cloud) - edfinr R package (install.packages('edfinr')) - tidyverse, ggplot2, scales R packages - C2C Student Pathways Dashboard: https://databydesign.caschooldashboard.org/ - C2C Data Dictionary and Definitions Guide - Guided R Markdown Notebook (provided) - Projector / shared screen for class discussion	Undergraduate students enrolled in an introduction to education policy, data science, or social science research methods course. Students may come from diverse backgrounds — first-generation college students, community college transfers, students from under-resourced K-12 districts — and many will have personally experienced the funding inequities examined in this lesson. No prior R experience is required; the guided notebook scaffolds all code.

Learning Objectives

By the end of this lesson, students will be able to:

- **Use the edfinr R package to retrieve, filter, and explore K-12 school district finance data across states and years.**
 - Demonstrated by: Successfully running `get_finance_data()` with at least two filter combinations and describing the output.
- **Interpret visualizations connecting per-pupil spending and poverty rates from edfinr data, and link those patterns to student outcome data visible on the C2C Student Pathways Dashboard.**
 - Demonstrated by: Identifying and articulating one equity trend in both datasets during class discussion.
- **Define data suppression and explain why the C2C dashboard hides data for groups of 10 or fewer students, connecting this policy to the protection of marginalized communities.**
 - Demonstrated by: Correctly answering the data suppression reflection prompt in the exit ticket.
- **Formulate a measurable data-driven research question about educational equity and identify the specific edfinr variables and C2C dashboard filters needed to investigate it.**
 - Demonstrated by: Submitting a complete exit ticket with a well-defined research question and variable identification.

Overview of Lesson Plan

Time	Task	Materials
0–10 min	Opening Hook: Explore the C2C Dashboard together — filter by student group and region	C2C Dashboard, projector
10–25 min	Mini-Lecture: How K-12 school funding works; equity gaps; intro to edfinr	Slides, whiteboard
25–55 min	Guided R Notebook: Load edfinr data, explore variables, create equity visualizations	R Markdown Notebook
55–68 min	Discussion: Connect R findings back to C2C Dashboard; address data suppression	C2C Dashboard
68–75 min	Exit Ticket: Research question + variable identification + data suppression reflection	Exit ticket handout

Lesson Plan Details

Activity 1: Opening Hook — What Do You See in the Data? (0–10 min)

Open the C2C Student Pathways Dashboard on the classroom projector. Navigate to your legislative district's data and use the demographic filters to display outcomes for different student groups.

Discussion Prompts (open-ended):

- What patterns do you notice when you switch between student groups? What surprises you?
- Notice the 'How do I read this chart?' pop-out box — what does it tell you about how to interpret the visualization?
- Do you see any blank or suppressed data points? Why might some data be hidden?
- If you attended a school with low per-pupil spending, how might that have shaped your pathway to college? How else do we thinking school funding might be showing up in these demographic data?

Instructor Notes:

Use the 'information circles' (i) on the dashboard to walk through key terms. Point out instances of data suppression (groups with $N \leq 10$) and tell students you will return to this concept. Use positive framing: emphasize that students from every background have arrived in this classroom because of their strengths and capabilities, and that data helps us understand systemic barriers — not individual limits.

Activity 2: Mini-Lecture — The Funding Landscape (10–25 min)

Deliver a 15-minute overview covering the following topics (slides provided):

- How K-12 school funding works: the three revenue streams (local property taxes, state aid, federal grants) and why they produce dramatically unequal outcomes across districts.
- Introduction to the NCES F-33 Survey: the national dataset that tracks how every school district raises and spends money.

- Introduction to edfinr: a new R package that gives researchers and students easy, tidy access to F-33 data combined with Census poverty estimates (SAIPE) and community demographics (ACS).
- The C2C Student Pathways Dashboard: how it connects funding context to student outcomes across the K-12-to-career continuum.
- Data suppression: the C2C dashboard hides data for student groups of 10 or fewer individuals, following the Cradle-to-Career System Data Suppression Protocol, to protect privacy. Smaller, more marginalized groups are more often suppressed — a critical equity consideration.
- Positive framing: review the asset-based framing principles embedded in the C2C dashboard and discuss how data can tell stories of resilience, not just deficit.

Activity 3: Guided R Notebook — Funding Equity in Code (25–55 min)

Students work through the provided R Markdown notebook (Funding_Futures_Notebook.Rmd). The notebook is scaffolded into three parts:

Part A — Getting Started with edfinr (25–35 min):

- Install and load edfinr, tidyverse, ggplot2, skimr, and scales.
- Run `get_states()` to browse available geographies.
- Call `get_finance_data()` for California, 2022 (skinny dataset).
- Explore the data: `skim()`, `names()`, `summary()` on key variables.
- Discussion checkpoint: What do `rev_total_pp`, `stpov_pct`, and `exp_current_pp` represent?

Part B — Equity Visualizations (35–50 min):

- Create a scatter plot of per-pupil revenue vs. district poverty rate.
- Color-code points by district locale (urban/suburban/rural).
- Add a trend line and discuss: does more poverty mean more or less funding?
- Pull a multi-year dataset (2018–2022) with CPI adjustment and create a trend line chart for California.
- Compare two states (e.g., CA and TX) to see structural differences.

Part C — Connect to the C2C Dashboard (50–55 min):

- Students return to the C2C dashboard, apply a poverty filter, and compare the dashboard patterns to their edfinr visualization.
- Guided question: 'Which C2C dashboard resource (data dictionary, student story blog, YouTube explainer) helps you interpret what you're seeing in both tools?'

Activity 4: Discussion — Connecting Findings (55–68 min)

Whole-class discussion facilitated by the instructor. Use the C2C dashboard on the projector alongside student-generated R plots.

Discussion Prompts (open-ended):

- What relationship did you find between a district's poverty level and its per-pupil revenue? Is this what you expected?

- Looking at both your R visualization and the C2C dashboard, where do you see the funding patterns showing up in student outcomes?
- Some student groups in the C2C dashboard are suppressed. Based on what you know about data suppression, which communities are most affected by this? What are the implications for advocacy and policy?
- Imagine you are an educator at a high-poverty district. What story would you want this data to tell about your students? How does positive framing change the narrative?
- What additional variables from the edfinr 'full' dataset (e.g., exp_instr_total, exp_tech equip) would help you understand whether funding differences translate into different learning experiences?

Exit Ticket

Students complete the following written exit ticket (on paper or submitted digitally) in the final 7 minutes of class:

Exit Ticket — Funding Futures

1. Research Question: Write one data-driven research question about K-12 education equity you want to investigate further. Be specific — name the variables and the population.

Example: 'Does per-pupil instructional spending (exp_instr_total in edfinr) predict higher graduation rates in high-poverty California districts on the C2C dashboard?'

2. Variables: List two edfinr variables and one C2C dashboard filter you would use to answer your question.

3. Data Suppression: In 2–3 sentences, explain what data suppression is, why C2C suppresses data for groups of $N \leq 10$, and how this could affect your research question.

4. Reflection: In one sentence, describe a community or student group that you believe is underrepresented in education finance data and explain why visibility matters.

Supplemental Questions

1. How does your lesson plan consider populations within your community?

This lesson centers on equity from the first moment. The opening hook uses the C2C dashboard's demographic filters to make visible the differential outcomes experienced by students from different backgrounds — including those from the communities that undergraduate students themselves may come from. The edfinr data reveals how systemic funding decisions (rooted in local property tax structures) create resource-unequal schools. The lesson deliberately uses asset-based, positive framing, emphasizing that all students arrive with strengths, and that data exposes structural barriers — not individual deficits. Students are explicitly invited to see their own educational journeys in the data, whether as the students who attended well-resourced or under-resourced schools.

2. How do you see yourself reflected in the data? How do you help students see their journeys?

Undergraduate students, especially first-generation college students and community college transfers, often attended K-12 schools that appear in the lower-funding bands of the edfinr dataset. This is true for myself, coming from a low-income background and being the first in my family to graduate from college. The lesson creates a direct line between national finance data and the students' own lived experience. The discussion prompts explicitly ask: 'If you attended a school with low per-pupil spending, how might that have shaped your pathway to college?' This primes students to think about their own schemas of poverty before engaging with the realities borne out in the data. The C2C student story blog then (a dashboard resource used in Part C) features narratives from real California students whose journeys mirror those of the students in class. By reading these stories alongside the data, students practice seeing quantitative patterns as reflections of real human experiences — including their own.

3. How and when would you incorporate this lesson into your curriculum?

This lesson works best early in a semester (Weeks 2–4) as an anchor lesson that establishes the 'why' of education data science. It builds on students prior learning with R and introduces them to equity-focused data work simultaneously, setting the tone for a course built around data literacy as a tool for social change. It could also be taught in Week 8–10 after students have R basics, allowing them to work more independently on the notebook. For courses in education policy, it pairs well with readings on the history of school finance litigation (e.g., *Serrano v. Priest*, *Rodriguez v. San Antonio*). For data science courses, it provides meaningful real-world datasets from the first day of coding.

4. What learning standards does this lesson incorporate?

This lesson incorporates multiple frameworks:

- California K-12 Data Literacy Standards (embedded in CA Mathematics Framework): 'Use an inquiry process to extract answers to real-world questions from data sets' — the precise definition of data literacy used by the C2C rubric.
- Universal Design for Learning (UDL): Multiple means of engagement (visual dashboard, hands-on coding, discussion, written reflection); multiple means of representation (narrative framing, quantitative visualization, code); multiple means of action (guided notebook scaffolding, open-ended discussion, individual exit ticket).
- ISTE Standards for Students — Data and Analysis (Standard 5): Students collect, analyze, and curate data using digital tools.
- Association of American Colleges & Universities (AAC&U) Quantitative Literacy VALUE Rubric: Interpretation, representation, calculation, application/analysis, and communication of quantitative data — all practiced in this lesson.
- Open Education Network Data Literacy Competency Framework: formulating research questions, identifying data sources, interpreting visualizations, and communicating findings.