People-Powered Data:
Designing a Data System for and with All Californians

KEY TAKEAWAYS

- To ensure the California Cradle-to-Career Data System (C2C) can fulfill its promise, it must be used. User-centered design principles can support this objective and promote the system's success.
- Tailoring data tools and formats to meet the diverse needs of users based on their backgrounds, interests, and comfort levels can foster wider accessibility and facilitate deeper engagement with the data.
- By continuously gathering feedback from users and stakeholders, C2C can cultivate a culture of ongoing improvement, which is essential to achieving its goal of providing accessible and useful data tools to support Californians throughout their education and career journeys.

The California Cradle-to-Career Data System (C2C) has the potential to be an essential tool for tracking and improving educational outcomes for students across the state. Thus far, policymakers, higher education leaders, and other stakeholders have dedicated significant time and resources to gather the necessary information to understand, evaluate, and make evidence-based decisions, to better serve their students and constituents, particularly those from marginalized communities.

Following the passage of the California Cradle-to-Career Data System Act in 2019, the state has been developing a longitudinal data system that will provide a central, interconnected hub for information on early education, K–12 education, colleges, social services, employment, earnings, and more. In 2022, the C2C Office signed landmark data-sharing agreements with 15 educational, social services, and workforce entities that laid the foundation for this data system.

Although the task of assembling these 15 data providers was challenging yet necessary, it is not sufficient to ensure the system's success. The development of the data system must be approached with meticulous attention to the needs and preferences of the system's various stakeholders.

For students and families, resources will inform their education and career decisions, including available college programs, labor market information, and the status of college and financial aid applications.

For educators, resources may include tools to help monitor their students' progress and provide tailored support and interventions.

For researchers, the objective may be to secure access to anonymized data to conduct original analyses that examine the pathways, progress, and outcomes of Californians, programs, and policies.

For advocates and community-based organizations, resources may include metrics on the state of opportunity relevant to their mission and objectives.

For policymakers, the California Cradle-to-Career Data System could provide actionable data that shape policies and advance prosperity for their constituents and the state.
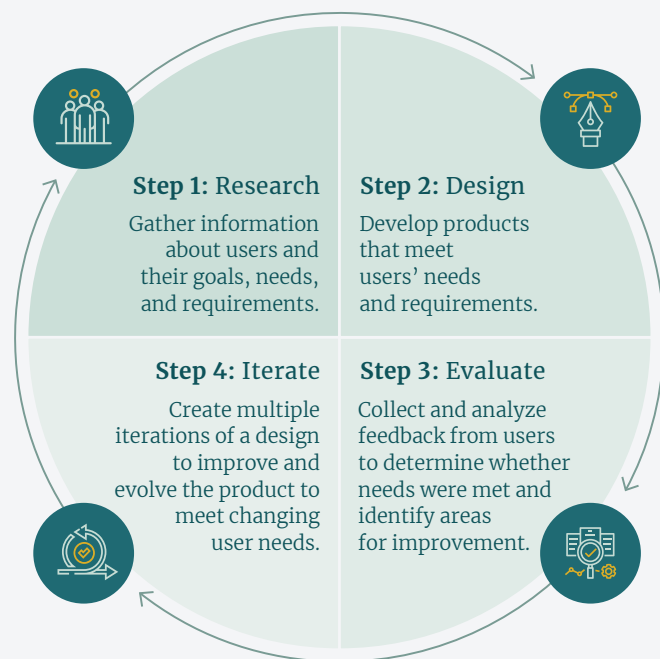
To ensure C2C can fulfill its promise, it must be used, and user-centered design (UCD) principles can support this objective and promote the system's success. UCD is a holistic approach to creating products and services that places users and their needs at the center of the design process. (For more information, see sidebar *Key Steps of User-Centered Design.*) By fully considering the needs of each user of C2C throughout its development, the system can be optimized to solve the problems at hand and provide the most value.

ensure that developed products are focused solutions that address the root of people's needs. In today's competitive landscape, where multiple products may be available and vying for use and attention, organizations that don't have their users at the forefront risk increased or wasted expenses, falling behind competitors, or developing a product that insufficiently addresses the problem it aims to solve.

Key Steps of User-Centered Design (UCD)

UCD is an approach to product design and development that focuses on the user's needs and experiences. By putting the user at the center of the design process, UCD helps ensure that developed products create a better experience for the intended audience, improving the products' access, credibility, and sustainability.

The four main steps of UCD are:

Step 1: Research
Gather information about users and their goals, needs, and requirements.

Step 2: Design
Develop products that meet users' needs and requirements.

Step 4: Iterate
Create multiple iterations of a design to improve and evolve the product to meet changing user needs.

Step 3: Evaluate
Collect and analyze feedback from users to determine whether needs were met and identify areas for improvement.

UCD is a continuous process, with each step informing the next and engaging users at every point. Implementing UCD may seem time- or resource-intensive, but it can produce an enormous return on investment. It creates opportunities to

Integrating UCD into the Development of C2C

California's data future and its path to becoming a more prosperous state lie within a robust data infrastructure grounded in trust, equity, and accessibility. By integrating UCD principles into C2C's design and implementation process, the resulting product will guide productive action toward supporting all Californians from early childhood to career. In this brief, we explore the steps taken by the C2C Office to prioritize UCD throughout its development and reflect on the experiences of California Competes in developing the California Postsecondary to Prosperity Dashboard (P2P Dashboard) (see sidebar *California Postsecondary to Prosperity Dashboard*), to provide recommendations on how to enhance the C2C development process through the framework of UCD.[1]

California Postsecondary to Prosperity Dashboard

California Competes's experience in data tool development illustrates how the UCD process can produce far-reaching results, even on a small scale. For this brief, we look specifically at our development of the the California Postsecondary to Prosperity Dashboard (P2P Dashboard), a collection of regional and state measures of education, employment, and quality of life. Inspired by our earlier research on disparities in opportunity across regions and demographic groups, this interactive digital tool

sought to present these differences in a fashion that invited comparison, reflection, and action.[2] Over the years, we have continued to improve and refine the P2P Dashboard, leveraging several UCD practices that allowed us to optimize impact. Our takeaways from this process can help generate ideas for the C2C team as it moves forward—especially since the P2P Dashboard and C2C share similarities in goals, anticipated features, and metrics.

| Step 1: Research | Step 2: Design | Step 3: Evaluate | Step 4: Iterate |

Gather information about users and their goals, needs, and requirements.

Identifying the intended users for the product and understanding their unique needs, abilities, and backgrounds are foundational to the UCD process. This step cements the focus on developing for key audiences rather than the natural tendency to veer toward the preferences of those developing it. In the case of data tool development, it is important to identify what type of data the users are interested in or need and how the data can influence decisions or outcomes, as well as accessibility considerations for the full range of intended audiences. The key objective is to obtain a clear understanding of the intended users to discern what and how to present data so the users can accomplish their respective goals. Consider using trusted liaisons when gathering information directly from key audiences to help ensure honest feedback.

The C2C's Current Plan and Development

The law establishing C2C codifies several UCD-centric mechanisms for collecting information and feedback from potential users, including through the following avenues.

▸ **The C2C Planning Process**

The inclusive, 18-month process was shaped by a work group made up of diverse partners from early learning, K–12, and postsecondary education; employment and workforce training; social services; and health departments. The work group also included data experts and members of the public. Many of the work group's subcommittees solicited feedback directly from intended users of C2C to develop recommendations and proposals for C2C. The Community Engagement Subcommittee is specifically tasked with creating avenues to better understand C2C data users, incorporate their perspectives, increase buy-in, and ensure equitable access to the data.

▸ **The C2C Governing Board**

The C2C Governing Board is tasked with guiding, supporting, and making decisions for C2C's implementation. It incorporates representatives of all the intended users of C2C. To ensure broad representation on the C2C governance structure as well as its public accountability through codification, California took a unique approach

demonstrates its priority to creating a system that serves all Californians.[3] This arrangement nurtures inclusiveness, transparency, and collaboration, ensuring all users' perspectives are heard and influence the direction of C2C.

Community Conversations

The public is regularly engaged and involved throughout the C2C development process through a series of interactive webinars called Community Conversations. Since June 2022, the C2C team has engaged more than 180 members of the public through this series, soliciting feedback on the look and functionalities that users would like to see in the Dashboard as well as guiding terminology use and branding.[4]

The Student Experience Audit

The C2C team plans to collect feedback directly from students through an annual student audit. The first phase of the audit has already taken place. During this phase, 10 interviews were conducted with people who work directly with students and therefore can speak to students' challenges. The team plans to broaden the scope to include students and additional sources of data collection (such as surveys).[5]

Insights from California Competes's P2P Dashboard Development

In building the P2P Dashboard, California Competes decided to focus our attention on four groups—state lawmakers and their staff, business leaders, civic leaders, and journalists—given their pivotal roles in improving state higher education and workforce policy and the high value they place on carefully researched and thoughtfully presented metrics. Many of these users have priorities on a regional level, so we aimed to include more granular statistics that apply to their respective regions, instead of only statewide metrics. Given the busy schedules and tight deadlines faced by many of these groups, the website was intentionally designed for quick and efficient access to the necessary information. Additionally, California Competes carefully selected staff with existing relationships or similar expertise to interact with the key user groups to facilitate trust and establish open dialogue throughout the UCD process. California Competes was able to gain a deeper understanding of users' needs and preferences, resulting in a product and accompanying training that better meet the unique requirements of its intended audiences. This approach ensures that the product is tailored to its users and helps build long-term relationships that will continue to inform future design decisions.

Implications from Our Work

- Invest time to engage directly with key audiences to reveal differences, even minor ones, in how they prefer to consume data, provide feedback, and be trained.
- Leverage preexisting relationships or trusted stakeholders to connect with key audiences and obtain candid feedback.

RECOMMENDATIONS FOR OPTIMIZATION

▸ **Be Intentional and Creative in Expanding Options for Engaging in the Community Conversations Series**

So far, all Community Conversations have been conducted virtually. The C2C team should consider exploring in-person venues to receive feedback from those who are uncomfortable interacting in a virtual environment or who lack the necessary technology to participate online. In-person events provide a different—and often more engaging—environment that draws out deeper insights and conversations. Providing a mechanism for feedback that does not require real-time participation in a meeting would be helpful for those whose schedules will not allow them to join a live meeting. For hard-to-reach audiences, consider identifying trusted individuals and groups who can help facilitate engagement or utilizing on-the-ground outreach tactics, such as distributing flyers or capitalizing on convenings they may be attending outside of C2C-related meetings, to meet these user groups where they are.

▸ **Ensure a Representative Sample in the Student Experience Audits**

The upcoming student audit can be a powerful tool for improving student outcomes if the C2C team gathers feedback from students from a wide variety of backgrounds and localities. We recommend the student audit include a diverse sample of students from urban and rural areas; various locations across the state; different age, sex, race/ethnic, linguistic, and economic backgrounds; and with different family structures (such as student parents).

Develop products that meet users' needs and requirements.

Once key audiences, goals, and requirements are determined, it is time to design features and structures that align with and are built toward those specifications. Each design decision should be implemented based on information gathered about the intended users. The focus is on stepping into the users' shoes and removing the barriers that hinder them from achieving their goals. With testing, this will become an iterative design that gets stronger and more intuitive for key audiences to use over time.

The C2C's Current Plan and Development

The C2C five-year implementation work plan creates a strategy to incorporate UCD principles in the dashboard, query builder tool, and overall data system.[6] There are also plans to make data tools available for students, families, and counselors that are different than those available to community members, researchers, and policymakers. For example, CaliforniaColleges.edu is an existing data tool that has been integrated into C2C and

allows students, parents, and counselors to plan for college by providing information on qualifying high school courses, descriptions of the types of financial aid available, and the ability to link to and begin a financial aid application in a central location. Researchers, on the other hand, will likely be most interested in the query builder tool and other functions that will allow them to export and analyze data sets.

Insights from California Competes's P2P Dashboard Development

In building the P2P Dashboard, we spent significant time designing the Dashboard and its related products to meet users' needs. For example, many stakeholders looking for educational data were interested in understanding how outcomes differ by demographic characteristics. As such, we focused on creating components that easily allow users to compare measures based on demographic traits of interest. We also understood that users sought disaggregation categories that were important but challenging to locate, such as finer-grained race/ethnicity breakdowns by national origin (such as Mexican Californian), incarceration status, and parenting status.

Through the first UCD step of research, we learned that key users were focused on understanding their specific region, so curating data sets that can be drilled down to a regional or county level was a priority for this Dashboard.

With the understanding that users will want to interact with the data in different ways, we provided multiple avenues to connect with the data, including dashboards, factsheets (Figure 1), a research report, downloadable data in comma-separated values (CSV) or Portable Document Format (PDF) files, links to charts, and recorded webinars, as well as one-on-one meetings with users led by California Competes staff.[7] While researchers may take advantage of the downloadable data, we also provided other visuals that appeal to those who are less familiar with data. Journalists, legislative staff, and other

leaders are short on time or are typically on a deadline, so it is important to provide information that can be quickly absorbed, in a format that is straightforward and easy to understand and contextualize.

**Figure 1:** Example of a P2P Dashboard factsheet
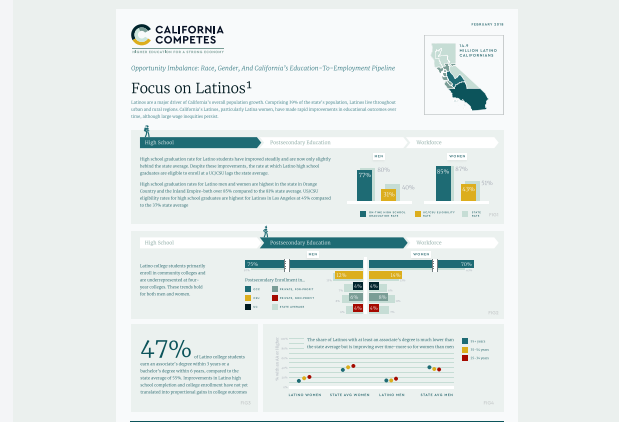
To help users put values in context, we incorporated a feature where hovering over a metric reveals the regions with the lowest and highest values as well as the statewide value for comparison (Figure 2). This allows users to understand how the metric fits into both the larger context of their focus area and that of the state. Additionally, we used plain language throughout the Dashboard and included simple source information under the info button for each metric to ensure users understand the underlying data and where it originates. We eliminated visual clutter and minimized jargon, so users were not overwhelmed with confusing or unnecessary text. Instead, we referred interested users to a separate, comprehensive, and detailed technical appendix.

Figure 2: Regional comparisons in the P2P Dashboard

Figure 3: Mobile view of the P2P Dashboard
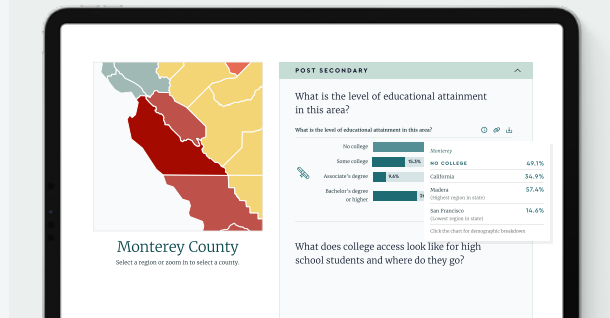
Across all features, context, and design of the Dashboard, we made sure that it was as mobile-friendly as possible for users, making it easier to access and use the information they need on the go (Figure 3).
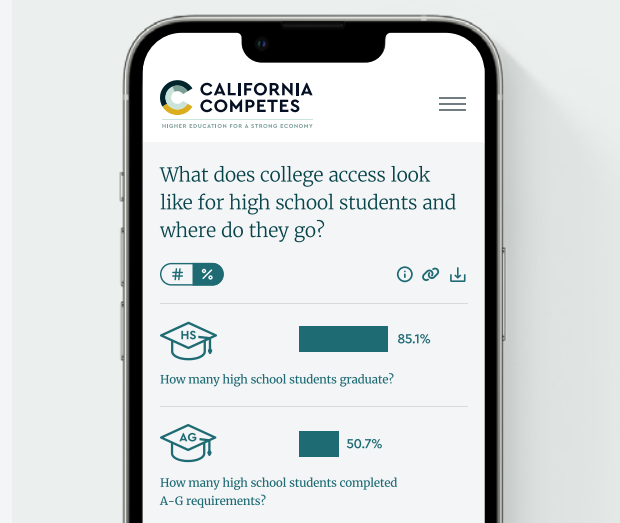
Implications from Our Work

- Consider the amount of time users have, the various platforms (particularly mobile devices) users may view the data from, and how they will want to use the data to guide design.

- Provide different ways of presenting the data to improve accessibility for users with varying degrees of tech savviness, familiarity with the information, and analytical skills. No single format will work for all users.

RECOMMENDATIONS FOR OPTIMIZATION

▸ **Include Disaggregated Data Where Possible**

The C2C caters to some of the same populations that the P2P Dashboard does and, as such, should also provide disaggregated data to avoid masking opportunity gaps within subpopulations. From user research, learn which disaggregation categories are important to key users—they may not be the ones that C2C anticipates. In addition, C2C users also include individuals working in specific communities, such as teachers at a particular school district or a mayor looking to allocate resources to constituency areas with the greatest need. Therefore, C2C should present data for small geographic service areas, such as neighborhoods, cities, K–12 school districts, and community college districts, to the greatest extent possible. Again, listen to what key users identify as important clusters to analyze.

▸ **Design for Populations with Varying Degrees of Data and Research Knowledge**

The C2C team should consider making data available in a variety of formats and the appropriate descriptive contexts so that, no matter their familiarity with the data, various users can easily glean the pertinent information they need and accomplish their respective goals. These formats might include raw data for researchers; secure individual-level data for teachers or parents working directly with students; and higher-level formats, such as short narrative summaries, for policymakers and practitioners. Across all

formats, it is crucial to maintain consistency in structure and clarity and to make the open or publicly available data accessible in a format that is easy to find, edit, and share. By adopting these principles of open data, the C2C team can promote transparency, accountability, buy-in, and collaboration while making data available for broader and more innovative use.

Pay special consideration to the use cases in which students or those supporting students leverage C2C data for planning purposes. This use case, especially, requires a design that is user-friendly, intuitive, and focused on helping students, parents, and counselors make informed decisions about their educational pathways. To achieve this, consider ways to provide personalized recommendations based on the user's data, such as their academic history, interests, and career goals. The system should also be transparent about how the data is collected, stored, and used and provide options for individuals to control their data privacy settings.

Step 1: Research | **Step 2:** Design | **Step 3: Evaluate** | **Step 4:** Iterate

Collect and analyze feedback from users to determine whether needs were met, and identify areas for improvement.

One of the best ways to optimize a product is through user testing and feedback. This process helps to quickly identify problems users face when interacting with the product, reveals how well design choices meet user needs, and helps create a more seamless experience.

The C2C's Current Plan and Development

The C2C is broadening its potential user base and collecting diverse feedback by utilizing the networks of its Governing Board and advisory board members. The C2C team actively engages potential users through the previously mentioned Community Conversations, and board members promote these events within their networks. Board members also educate the community about C2C and upcoming opportunities for engagement through presentations at their own events. In this way, they collect feedback to bring back to the C2C team, diversifying and widening the user base for obtaining feedback.

Insights from California Competes's P2P Dashboard Development

We found that gathering user feedback was critical for creating a stronger product, helping improve accuracy and rigor, and building buy-in for using the P2P Dashboard. This process is particularly critical for creating an information tool that spans multiple content areas, geographic areas, and sectors without a centralized body to drive coordinated strategy across all regions and sectors. When we conducted our user testing (in the form of focus groups and one-on-one external review requests), we reached out to individuals representing diverse roles and geographic areas and varying degrees of familiarity with

education, workforce, and quality-of-life data. Through these efforts, we were able to identify data errors, correct confusing and counterintuitive information, increase awareness and use of the Dashboard, and motivate users to contribute to the tool's success. One journalist who provided feedback ended up using the Dashboard to provide supplemental information for an article shortly after and circled back to share its impact with California Competes.

Implications from Our Work

- User testing is important for assessing impact, validating usability decisions, strengthening user-base buy-in, and improving data accuracy.

- Engage a representative sample of users to promote the quality and range of feedback received.

- Provide open-ended avenues, such as a feedback form or a chat function on the C2C web page, for key audiences to provide feedback and thoughts, even after product launch.

RECOMMENDATIONS FOR OPTIMIZATION

▸ **Extend Community Engagement Efforts Beyond Those Directly Connected to the C2C Community**

While the current approach of regularly engaging stakeholders is promising, the C2C team should expand their outreach efforts to include individuals beyond their listserv, network, and social media followers. It would be beneficial for them to proactively seek out advocacy and research groups from diverse backgrounds and reach out to potential users of different ethnic, racial, age, sex, and socioeconomic backgrounds to test and review C2C tools before their release.

▸ **Provide a Variety of Avenues for Collecting User Input**

The C2C staff should consider different types of feedback to improve their data system, including in-person feedback and alternative formats for asynchronous feedback. Focus groups and data walks (an interactive approach to data exploration that involves walking through a space and engaging with data displays and other visual representations) with educators, counselors, and others who interact with students could provide valuable insights on the barriers to education and career success that the system can address.[8] In addition, providing an easy way for users to report errors would encourage participation in continuous improvement. For example, C2C can incorporate a simple Report an Error button across its data tools and resources. Another option is to incorporate error reporting into its already established or new community forums. These recommendations will help the C2C team gather comprehensive and continuous feedback to improve the data system.

Create multiple iterations of a design to improve and evolve the product to meet changing user needs.

UCD is a continuous process of design, evaluation, and improvement. Therefore, collecting user feedback should be ongoing, with an embedded process for open-ended assessment and incorporation of meaningful recommendations that will ultimately result in a successful product that users return to again and again.

The C2C's Current Plan and Development

The C2C team has incorporated a culture of UCD throughout the data system's development. Many of the avenues have been noted in previous sections, such as the ongoing Community Conversations, the planned annual student audits, the C2C's governance structure, and the leveraging of its advisory boards. The language in the C2C five-year implementation work plan also indicates the commitment for "continuous improvement based on input and engagement."

Insights from California Competes's P2P Dashboard Development

Even after the P2P Dashboard's initial release, California Competes continued to collect feedback from users to inform future updates. Sometimes we deliberately recruited users to describe their experiences. Other times we received information about users' issues and requests in a more organic and unprompted fashion, such as audience questions following a presentation and emails from users seeking clarification about specific metrics or data sources. Feedback that we received after the Dashboard's launch led to updates, including new demographic breakdowns, disaggregating results into smaller geographic areas, selecting additional metrics that filled in information gaps, and improved functionality.

Additionally, we discovered that there were other major audiences for our Dashboard that we did not initially anticipate. Philanthropic and community-based organizations noted that the Dashboard was helpful in guiding their strategy and operations since their organizations had limited time to locate and analyze data. Once we became aware of their interest, we intentionally connected with them to better understand how they were using the Dashboard and how we could make it more effective. Through these conversations, we learned that these groups appreciated having a personal relationship with us to ask follow-up questions or to have us present findings and data from the Dashboard at speaking engagements. While community-based organizations sought in-person presentations, they were not necessary for some of the other groups. Ultimately, we incorporated formal and informal feedback into a major update of the Dashboard that we released in 2023.

Implications from Our Work

- Conduct regular and frequent review and incorporation of insights for design improvements.

RECOMMENDATIONS FOR OPTIMIZATION

▸ **Establish a Formal Review-and-Update Process for C2C**

To improve the effectiveness of C2C, implement a structured evaluation and revision procedure that is overseen by the Governing Board. Given that the data providers are required to send data on an annual basis, consider using this opportunity to update the data and make improvements to the public-facing tools and dashboards. By implementing a regular, formal review-and-update process, the C2C Office can establish a systematic approach to ensuring the data system is continually optimized to better meet the evolving needs of its stakeholders. This process should ideally include documentation of changes made to the system, as well as notices of upcoming releases, so that users can prepare for any adjustments or new features. Regular reviews and updates will allow the system to incorporate new data and insights while addressing issues or concerns that users raise.

It is essential that the C2C team continues soliciting feedback from users even after data tools have been released because user feedback can significantly enhance data quality and functionality. UCD principles emphasize the significance of user feedback and engagement, and this cycle of interaction should be an ongoing process rather than a one-time event.

As higher education systems and policies in California constantly change and evolve, it is crucial to continuously update the tools to account for new data being produced and new use cases. Building a highly functional data system requires continued effort and attention as the work is never truly complete.

Acknowledgments

Notes

1. California Competes. *Postsecondary to Prosperity Dashboard.* https://p2p.californiacompetes.org/

2. California Competes. (2018, February 26). *Opportunity imbalance: Race, gender, and California's education-to-employment pipeline.* https://californiacompetes.org/resources/opportunity-imbalance-race-gender-and-californias-education-to-employment-pipeline/

3. California Competes. (2021, April 21). *The Cradle-to-Career data system governance options, explained.* https://californiacompetes.org/resources/the-cradle-to-career-data-system-governance-options-explained/

4. California Cradle-to-Career Data System. (2022, September). *Cradle-to-Career Data System: Report to the legislature.* https://c2c.ca.gov/wp-content/uploads/sites/17/2022/09/C2C-Sep-2022-Legislative-Report.pdf

5. California Cradle-to-Career Data System. (2022, August 03). *Cradle-to-Career 5-year projected timeline.* https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:b9af4162-c8e6-4354-a101-c759185aea12

6. California Cradle-to-Career Data System. (2022, August 03). *Cradle-to-Career 5-year projected timeline.* https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:b9af4162-c8e6-4354-a101-c759185aea12

7. California Competes. (2018, February 26). *Opportunity imbalance: Race, gender, and California's education-to-employment pipeline.* https://californiacompetes.org/resources/opportunity-imbalance-race-gender-and-californias-education-to-employment-pipeline/; California Competes. (2020, July 29). *Postsecondary to prosperity: Examining California's opportunity landscape.* https://californiacompetes.org/resources/postsecondary-to-prosperity-examining-californias-opportunity-landscape/; California Competes. (2020, July 29). *Postsecondary to prosperity: A conversation about transforming an inequitable system to fuel opportunity.* https://californiacompetes.org/resources/postsecondary-to-prosperity-a-conversation-about-transforming-an-inequitable-system-to-fuel-opportunity/

8. The Education Trust-West. *Data Equity Walk toolkit.* https://west.edtrust.org/data-equity-walk-toolkit/

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