YDSL Young Data Scientists League

Annual Report
School Year 2021-22

Young Data Scientists League (www.youngdatascientists.org)

YDSL Annual Report (SY 2021-22)

A. Mission

The Young Data Scientists League (YDSL) is on a mission to empower every student, especially those who are underserved, to learn and apply critical data skills to make a difference in their personal lives and communities.

B. Our Core Values
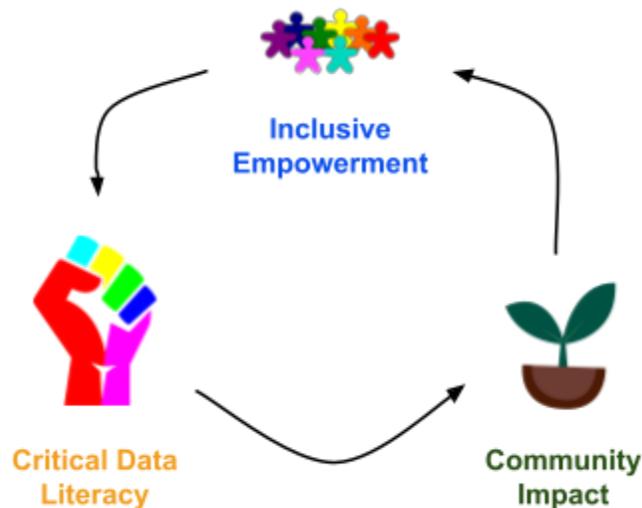
Inclusive Empowerment

Our end goal is equity: to empower students who have traditionally lacked access to profitable skills. We consider equity along all dimensions of privilege - including race, gender, economic class, and neurodiversity. Data is found everywhere in our world, and so every student should belong in data science too. We value every student's unique cultural capital and skill sets.

Critical Data Literacy

We believe that the best way to empower diverse learners is through exploring problems that matter to them personally. Whether or not each student will "become a data scientist", data literacy is an essential 21st century skill for everyone. We value rigorous critical thinking and we challenge our students to use data to gain a deep, personal understanding of societal issues.

Community Impact

We have seen firsthand how young learners can make a positive difference in their community using critical data literacy. We value problem-based learning (PBL) because it gives students a voice and pathway for real-world impact. We believe that when our students are empowered to improve the lives of their peers, it creates opportunities for others to follow in their footsteps.

Through this cycle of reaching diverse students, teaching critical data literacy, and achieving community impact affecting more students - we can build a movement of Young Data Scientists.

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C.i. 2021-22 Year in Review: Quotes

Inclusive Empowerment

"For the first time in a math class, I feel awake. I see myself in the curriculum, which has never happened before"

    - **8th grade student**, San Diego USD

"This project helped me do math again. After the calculus fiasco of 2020, I was hesitant to do any math. This project changed my mind." (link)

    - **11th grade student,** Bioscience HS

"Data science skills are useful in order to solve life problems, things you care about, business, debate, they're used in everything."

    - **11th grader**, Bioscience HS

"For me as a teacher, YDSL was a great professional development opportunity, and it's a lifelong lesson for students to learn about data science in real-life contexts"

    - **Ms. Trang Vu**, Marston MS

Critical Data Literacy

Community Impact

"Through this project I was able to connect my internship (at the YMCA) to my school work. Additionally, I was able to qualify for a scholarship that will help me cover the cost of attending ASU." (link)

    - **12th grade student**, Bioscience HS

"We as students intend on doing our best to get our town to provide our students with the resources necessary to have a positive impact on the mental health of the students of Cloverdale High, and maybe even the community of Cloverdale" (link)

    - **Cloverdale HS Team**

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C.ii. 2021-22 Year in Review: Metrics

Inclusive Empowerment	Our Reach	Race & Gender	Class / SES
	109 Classrooms in YDSQ	**80%** Racial minority	**44%** Title I Classrooms
	3,200 Students in YDSQ	**41%** Female / Non-binary	**27%** Low-Income (self-identified)
	30,000* Students from youcubed	**54%** Black / Hispanic / Native students	**21%** First to go to college in family

Critical Data Literacy

78%
of all classrooms used our Young Data Scientists Quest (YDSQ) program in-school this year

A more complete picture will be provided by study results from our identity & belonging survey of San Diego summer enrichment students (up to n=530 respondents) which will contain more information about self-reported efficacy and desire to use data science in college / career.

Community Impact

89%
of all teams completed YDSQ, presenting projects at Data Games. So far, we are aware of **two classes** - Cloverdale and Bioscience - achieving community impact (both through actions targeting student mental health).

For a more detailed view of our metrics, see: Appendix A: Detailed Breakdown of Goal Metrics

* based on a verbally shared estimate from youcubed program staff on curriculum adoption and usage (as of Spring 2022)

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D. 2022-23: Key Challenges and Opportunities

In the 2021-22 school year, we made several major changes to our program in order to reach the level of impact we've had. We entered the classroom, which required us to switch to a model where we taught teachers how to teach YDSQ (i.e. becoming "teachers of teachers").

Fig 1. Thank you video from one of our many Title I classrooms
(Spring '22 @ Marston Middle School, San Diego, CA)

As we learned - scaling is an entirely new challenge! In order to make YDSQ in the classroom possible, we invested significant effort in many areas, including but not limited to:

1.) **Launching YDSQ's online platform** (which required splitting our bootcamp lessons into bite-sized modules, sandboxing our tech, creating facilitator guides, and more)
2.) **Supporting larger teams** (which involved crafting team roles, PBL guiding questions, and removing all direct-to-student touchpoints)
3.) **Scaling our mentorship & support** (creating our first professional development materials and experimenting with new ways of mentor engagement)

Doing so enabled us to not only succeed our scale goals (reaching over 3,000 students) but also make significant progress on our diversity goals (over-representing all racial minorities by census proportion and increasing our share of female + non-binary students overall*).

Scale only tells part of the story. This year we saw our students deliver true real-world impact, with several classrooms choosing to partner with their local school administrations and community orgs. This is a huge testament to the "extra credit" we did, from creating additional data viz and analysis workshops to doing hands-on work with our teachers at office hours.

As we look forward to new ideas and challenges, we can celebrate the considerable accomplishments we've reached this year. Congratulations on an incredible year!!

* pending estimated retention numbers from our summer program

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E. Summary

This year, we reflected and discovered that our team is fundamentally driven by a shared set of core values: **Inclusive Empowerment**, **Critical Data Literacy**, and **Community Impact**. As we continue to grow, we will also brainstorm ways we can further pursue these values in our work.

We'll challenge new students to achieve community impact by exploring authentic topics that are culturally relevant (delivering a true PBL experience). In the process, students will gain the opportunity to learn data science not only through the existing lens of STEM, but also in a critical manner that considers equity and society and can be related to any classroom subject. We've seen firsthand this year how students can create impact and make waves among their peers, and this next year could be the year we turn this energy into a movement.

Doing so will require us to solve many challenges that our team has identified (e.g. from creating new content to scaling our platform + mentorship recruitment to covering our legal bases as we grow). In the process we'll aim to capture results in research contributing to the state-of-the-art in data science education.

Finally, we cannot pursue this level of growth without considering sustainability - both financially and mentally. This year we'll challenge ourselves to find a values-driven business model that we can rely on to keep our work going.

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Appendix A: Detailed Breakdown of Goal Metrics

	2021-22 Goal	2021-22 Total	2021-22 School Year	2022 Summer
A1. Number of Teacher Advisors / Teams	10 to 20	109	9	~100 (est. - pending)
A2. Number of Students Served (Total)	300 to 450 (+180 to 330)	33,200	30,200	3000 (est. - pending)
A2i. Number of Students Served (Directly, e.g. YDSQ)	300 to 450 (+180 to 330)	3,200 (+3,050)	200	3000 (est. - pending)
A2ii. Number of Students Served (Indirectly)	N/A	30,000 *	*estimate from total youcubed usage as of Spring 2022*	
A3. Percentage of Female / Non-Binary Students	50% (+10%)	41% (+1%)	60% (+20%)	39.7% (-0.3%)
A4. Percentage of Students By Race	>15% Black (+12%) >27% Hispanic (+16%) >5% Asian >0.9% Native	16.4% Black (+13.4%) 35.8% Hispanic (+24.8%) 26.1% Asian (-42.9%) 2.0% Native	1.3% Black (-1.7%) 15.6% Hispanic (+4.6%) 14.3% Asian (-54.7%) 2.6% Native	17.4% Black (+14.4%) 37.1% Hispanic (+26.1%) 26.9% Asian (-42.1%) 2.0% Native
A5. Percentage of Teams From Title I Schools	70% (+60%)	TBD summer pending	44.4% (+34.4%)	TBD summer pending
A5i. Percentage of Low-Income Students	N/A	26.9%	21.4%	27.3% (start of program)
A5ii. Percentage of First to Attend College Students	N/A	20.8%	9.7%	21.5% (start of program)
A6. Team Completion Rate	75% (+25%)	TBD summer pending	88.9% (+38.9%)	TBD summer pending
A7. Percentage of Teams Using YDSL in Classroom	25% (+15%)	-	77.8% (+67.8%)	100% or N/A
A8. Number of Mentors	20 (+14)	69 (+63)	26 (+20)	43 * (+37)

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Appendix B: Financial Data & Spending Report

Since our inception in Fall of 2020, YDSL has operated completely dependent on volunteer efforts and in-kind donations, which are only in small part reflected in our financial data in 2021-22. We are grateful to all of our volunteers, from student leaders and mentors to our volunteer staff and Board, who have all contributed countless hours in pursuit of our mission. Without your contributions we could not have reached so many students the way we have.

As a newly approved 501(c)(3) public charity (under Section 509(a)(2)), YDSL is actively seeking funding to sustain our program operations so that we may continue to reach underserved students in need of culturally relevant data science education.

Type of Revenue	SY21-22 Tax Year
	7/1/21 - 6/30/22
1. Gifts, grants, and contributions received	Total: **$972.68** from in-kind donations
2. Membership fees received	- 0 -
3. Gross investment income	- 0 -
4. Net unrelated business income	- 0 -
5. Taxes levied for your benefit	- 0 -
6. Value of services or facilities furnished by a governmental unit without charge	- 0 -
7. Any revenue not otherwise listed above or in lines 9 - 12 below	- 0 -
8. Total of lines 1 through 7	**$972.68**
9. Gross receipts from admissions, merchandise sold or services performed, or furnishing of facilities in any activity that is related to your exempt purposes	- 0 -
10. Total of lines 8 and 9	**$972.68**
11. Net gain or loss on sale of capital assets (provide an itemized list below)	- 0 -
12. Unusual grants (provide an itemized list below)	- 0 -
13. Total Revenue (add lines 10 through 12)	**$972.68**

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Type of Expense	Current Tax Year
	7/1/21 - 6/30/22
14. Fundraising Expenses	- 0 -
15. Contributions, gifts, grants, and similar amounts paid out (provide an itemized list below)	- 0 -
16. Disbursements to or for the benefit of members	- 0 -
17. Compensation of officers, directors, and trustees	- 0 -
18. Other salaries and wages	- 0 -
19. Interest expense	- 0 -
20. Occupancy (rent, utilities, etc.)	- 0 -
21. Depreciation and depletion	- 0 -
22. Professional fees	Total: **$234.00** - collaboration tools
23. Any expense not otherwise classified, such as program services (provide an itemized list below)	Total: **$738.68** - for program operations of YDSQ 2021
24. Total Expenses (add lines 14 through 23)	**$972.68**

Appendix C: Tax-Exempt Activities

Activity	Description
Curriculum and Learning Platform Development	Developed a free online data science curriculum for use in public schools grades 6 and above. Our goal with this curriculum was to expose underrepresented students to 21st century STEM fields through culturally relevant, real-world learning modules. The online learning platform was built virtually and funded through volunteer effort and out-of-pocket contributions.
Run Young Data Scientists Quest (Educational Program)	Developed a free, 12-week online learning program for students grade 6 and above to learn data science through a collaborative, team-based competition. Students learn data science in the first half of the program using our online platform and in the second half they apply data science to tell personal stories and solve problems in their local communities. We reached 350+ students from majority Title I or rural schools in the first two years of our program (2021, 2022). The event is free of cost and funded completely by volunteer effort.
Training and Classroom Placement for Industry Mentors	As part of the Young Data Scientists Quest (see Activity 2), we recruited and interviewed industry mentors to pair up with each participating classroom. Our goal with mentorship was to provide access to career knowledge and connections for students in traditionally underrepresented communities. The activity was conducted virtually and funded through volunteer effort and out-of-pocket contributions.
Professional Development for Teachers	As part of the Young Data Scientists Quest (see Activity 2), we built a professional development experience for teachers to learn data science basics and facilitate learning activities as part of our online curriculum. The activity was conducted virtually and funded through volunteer effort and out-of-pocket contributions.
Conduct Educational Research (In Partnership with Stanford)	To assess the efficacy of the Young Data Scientists Quest as a learning intervention, we partnered with the Stanford University Science in the City Lab to conduct a research survey on student identity and belonging in data science. The research consists of a 20-minute pre-post survey that reached 500+ participants in the first two years of our program operation. The activity was conducted virtually and funded through volunteer effort and out-of-pocket contributions.
Contribute Learning Materials to youcubed at Stanford	To expand the scale of our impact, we partnered with the youcubed math education lab at Stanford University to adapt our materials to their High School Data Science Curriculum. We contributed learning modules from the Young Data Scientists Quest, including an activity introducing students to data science through representation in the media. In total, we provided education to over 30,000 students via youcubed. The activity was conducted virtually and funded through volunteer effort and out-of-pocket contributions.