

Celebratory Showcase

2015-2016



**ADVANCED AUTHENTIC
RESEARCH**

POSTER PRESENTATION



PALO ALTO UNIFIED SCHOOL DISTRICT

May 16, 2016



LETTER TO THE COMMUNITY

Dear Palo Alto Unified School District (PAUSD) Community,

Welcome to our inaugural year of the Advanced Authentic Research (AAR) program at Palo Alto Unified School District. Our pioneering AAR students are engaging in original research in areas that matter deeply to them, whether in pursuit of their unique passion, or in their exploration of new interests. Working with mentors and the AAR team on their projects, they have demonstrated their ability to ask and answer profound real-world questions, tackle challenging problems, and in many cases contribute new knowledge or a meaningful work product to the field in which they studied. The research opportunities have also ignited student interest in exploring career pathways.

The evidence of the AAR mission to “nurture student interest and ignite student passion through real world, hands-on research” is demonstrated in the poster presentations featured tonight. We are proud that our students had the courage to engage deeply in this pilot year. These students have pursued a wide array of compelling questions rooted in STEM, Humanities, Business and Social Science fields. During this year-long project, students gained professional experiences that will equip them with collaborative and independent critical thinking skills to be flexible and adapt to our ever changing global community. Our long-term goal is to prepare our students to bring passion, curiosity, and perseverance as they solve problems that do not exist yet.

We are deeply indebted to all experts and leaders who have nurtured and guided our students throughout this inaugural year. Their steadfast support, dedication, and willingness to share their passions with our students led our students to achieve excellence as they personalized, integrated and communicated high-level research. Without their generosity, our first year would not have been possible.

Please join us in celebrating our very first Celebratory Showcase featuring our students’ extraordinary accomplishments!

Glenn W. “Max” McGee, Ph.D.
Superintendent

Jeong V. Choe, Ph.D.
Advanced Authentic Research Coordinator



THANK YOU

Thank you to the mentors, community, PAUSD staff, and Board members (President Heidi Emberling, Vice President Terry Godfrey, Melissa Baten Caswell, Camille Townsend, Ken Dauber) for making this possible. We would like to thank the following individuals, organizations, and committee:

Palo Alto Chamber of Commerce

Silicon Valley Talent Partnership

Stanford University Outreach Department

CTE Steering Committee

CTE Advisory Committee

Palo Alto and Henry M. Gunn High School Administrators

(Kim Diorio, Denise Herrmann, & more)

PAUSD Educational Services Department

(Markus Autrey, Linda Dillon, & more)

PAUSD Digital Publishing and Information Technology support

(Jill Kuechle, Isidro Pimentel)

JLS staff (Sharon Ofek, Judy Lukensmeyer, custodial staff, & more)

for supporting AAR and being the first school to host our inaugural closing event

PAUSD Futures Program students

for providing desserts

Volunteers

(Peter O’Riordan/Program Advisor, Stephanie Youngquist, Renu Kumar, & Filomena U)

All of our mentors:

Adam Gundran, Adam Jung, Adam Yonkers, Alice Hahn, Alice Shieh,
Angela Merchant, Barb Miller, Barbara Sih Klausner, Barry Hart,
Benjamin Pinsky, Bo Yu, Bruce Ling, Catarina Williams, Chris Kolar,
Christopher Farina, David Willoughby, Debbie Whitson, Du Li, Elda Dzillc,
Eric Sabelman, Esala Chandrasena, Eunice Hung, Gianna Giancarlo,
Gihani Wijewickrama, Hadi Hosseini, Harman Johll, Jack Bungarden, Jed Black,
Jeong Choe, Jessie Dotson, Jia Pu, Joe Baker, Joy Wu, Leslie Berlin, Lili Jiang,
Liz Martinez, Malcolm Slaney, Margaret Cain, Matt Yun, Max McGee,
Miguel Fittoria, Minnie Ho, Nancy Coffey, Natasha De Caiado Castro, Pablo Villoslada
Ray Ravaglia, Rebecca Navarro, Robert Cheung, Scott Lew, Sean Wu, Steve Chien,
Sudhanshu Pant, Tasha Souter, Wenonah Vercoutere, Xue Gong, Yue Wang, & Zhang Cheng

To everyone that had a direct or indirect impact on our program, THANK YOU.



PROGRAM HALLMARKS

- Advanced Authentic Research (AAR) began with Dr. Max McGee mentoring eleven students in April of 2015 from Gunn and Palo Alto High Schools. The program expanded to over seventy students in the Fall of 2015.
- We hosted an information session in October 2015 where many students and parents expressed interest.
- We hosted our very first Opening Social in November 2015 with over 160 people in attendance. Dr. Max McGee and Dr. Jeong Choe collaborated in expanding the program to include 76 students. The evening also gave parents, students, mentors, and our AAR team (Deanna Chute, Angela Merchant, Meri Gyves, and Peter O’Riordan) a chance to meet and network.
- AAR international collaborators visited from Singapore in November 2015. During their visit, Dr. James Chang and Dr. Barry Hart gave an inspirational presentation to our exchange students.
- Angela Merchant, Deanna Chute, and Dr. Jeong Choe wrote the core curriculum for the AAR program.
- Working closely with Isidro Pimentel and Peter O’Riordan, AAR established its own logo and website in October 2015. AAR’s own electronic journaling system and mentor matching engine followed shortly after.
- AAR formed formal partnerships with Palo Alto Chamber of Commerce and Silicon Valley Talent Partnership. AAR continues to work closely with Stanford University.
- AAR formed a formal partnership with Palo Alto High School’s Social Justice program. The projects developed from this collaboration are also being showcased tonight.
- AAR was awarded a grant from California Department of Education in January 2016.
- Khan Academy started production of a video featuring AAR as an innovative program in April 2016.
- AAR has been featured in news outlets including: Gunn Oracle, Paly Verde, Palo Alto Online, Paly Campanile, Palo Alto Pulse, and Palo Alto Patch.
- AAR became University of California (UC) approved in April 2016.
- The program has grown to include over 200 students next academic year. With the support from the Special Education staff both at Paly and Gunn, we will have 14 special education students participating in the program.
- Approximately forty percent (excluding graduating seniors) of this year’s students are returning to continue their project next academic year.



STUDENT HALLMARKS

All AAR students have exceeded expectations and excelled in their research project this year. Here are some hallmarks of AAR students' accomplishments.

- **Clare Kammerer** will be starting a combined bachelors/masters program at Eugene Lang College for social research regarding gender, which will be a continuation of her AAR research project.
- **Zachary Kirk's** project, which focuses on the strategies available to combat the Islamic State and al-Qaeda, piqued his interest. He will be studying economics, international relations and Middle East studies at Stanford University.
- **Tara Madhav** was accepted into the Stanford Humanities Institute summer program to study "Racial Identity in the American Imagination." This work stems from her AAR research with Mr. Jack Bungarden on American racial and ethnic identities.
- **Samuel Vasquez** is going to pursue his AAR project on marketing and advertising further and study this field as an undergraduate student at San Francisco State University.
- **Caroline Bailey** and **Maritha Wang** shared their research at the Partners in Education (PiE) Circle Breakfast Briefing in March 2016.
- **Sophie Chumakova** and **Elena Jurczak** presented at Gunn Principal Coffee in March 2016.
- **Alan Chen, Arianna Groetsema, Xavi Loinaz, Antoine Khoa Nguyen, Allison Zhang, and Justin Yang** were accepted to present their projects at Synopsys Santa Clara Valley Science & Engineering Fair in March 2016.
- **Caroline Bailey** completed the first in a series of three novellas this year through the AAR program. The next two will be continued this summer and as an undergraduate student at Princeton University. Once completed, she plans to submit her work to Young Arts for publication.
- **Maritha Wang** is completing her manuscript on Oscillating Adsorption Thermodynamics of Small Molecule on Graphene for publication. Her work, which also involves international collaboration, was submitted to Singapore Science and Engineering Fair.
- **Jerry Xu** investigated the different types of winglets on fixed wing aircraft performance in his AAR project. Jerry's project sparked his interest in aerospace engineering, which he plans to study at University of Illinois-Urbana Champaign.
- **Sean Lin** deepened his familial bonds through special circumstances with his mentor over the course of his project. As he explored his passions and approached this project with a sense of curiosity and wonder, he found new ways to connect with those closest to him.



STUDENT PROJECTS

Part I: Advanced Authentic Research Projects

Daniel Baeza: *Role of Methylthioadenosine as a Therapy for Promoting Brain Repair in Patients with Multiple Sclerosis*

Mentor: Pablo Villoslada, University of California, San Francisco

Caroline Bailey: *Looking at STEM's Impact on What It Means to be Human through Science Fiction*

Mentor: Margaret Cain, Illinois Math and Science Academy (retired)

Danielle Bisbee & Anmol Nagar: *Presence of Microcystins from Cyanobacteria in Northern California Lakes*

Mentor: Esala Chandrasena, California Department of Public Health

Adele Bloch & Ivy Li: *Analyzing DNA Sequences for Quorum Sensing Inhibition*

Mentor: Gihani Wijewickrama, Eurofins Lancaster Laboratories

Sharat Bodduluri: *Analysis of Gunn's Athletic Training Room*

Mentor: Chris Kolar, Palo Alto Unified School District

Emily Shuangyue Cao: *The Extraction and Amplification of International Viral DNA*

Mentor: Benjamin Pinsky, Stanford University

Kathleen Chang & Jarrod Hsu: *Comparative Study of Antimicrobial Natural Products in Traditional Medicine Plant*

Mentor: Angela Merchant, Gunn High School

Alan Chen: *Uniquely Determining Identity Using Computer-based Analysis of Human Speech*

Mentor: Robert Cheung, Independent Software Engineer

Eric Chiang & Kevin Li: *Gene Correlation with Osteoporosis in Mice*

Mentor: Joy Wu, Stanford University Department of Medicine

Kaitlin Chiu, Ahana Ganguly, & Zahra Muzaffer: *Analyzing How Success is Defined by Palo Alto High School Students*

Mentor: Christopher Farina, Palo Alto High School

Sophie Chumakova: *Energy Consumption and Production Methods*

Mentor: Charles Hashem, Lockheed Martin

Elliot Clark, Niklas Risano, & Noah Yuen: *Hydration and Athletic Performance*

Mentor: Adam Jung, Ford Motor Company

John Dai: *Analysis of the Roots of Ancestry in the Qing Dynasty*

Mentor: Zhang Cheng, Stanford University

Clara de Martel & Teddie Stewart: *Analysis of Energy Consumption in the Palo Alto High School Media Arts Center*

Mentor: Rebecca Navarro, Palo Alto Unified School District

Nikhil D'Souza: *Measuring Brainwaves*

Mentor: Matt Yun, Lockheed Martin

Tamari Dzotsenidze & Takeru Nishi: *The Decline of Small Businesses*

Mentor: Debbie Whitson, Palo Alto High School

Arianna Groetsema & Allison Zhang: *The Expansion of Mobile Healthcare in Emerging Markets using HeMoClo*

Mentor: Sudhanshu Pant, Mobilitas

Samarth Grover Venkatasubramaniam: *A Market Study to Determine the Viability and Design Features of a Course Offering to Help High School Students Present their "Interest Portfolios" for College Admissions*

Mentor: Ray Ravaglia, Director Pre-College at the School of the New York Times

Brent Han & Ethan Li: *A Novel Device to Treat Obstructive Sleep Apnea (OSA)*

Mentor: Jed Black, Jazz Pharmaceuticals

Maya Homan & Leila Tjang: *Analyzing the Significance of Family Dynamics for Patients with Antisocial Borderline & Narcissistic Personality Disorders*

Mentor: Tasha Souter, Veterans Affairs Health Care System

Elena Jurczak: *Breast Cancer Occurrences and Mortality Rates Among Women of Different Races and Ethnicities*

Mentor: Jia Pu, Mathematica Health Policy Research

Joseph Kao & Leili Najmabadi: *Driving Towards Safety: Effects on Pupil Dilation During Unexpected Driving Events*

Mentors: Adam Gundran, Joe Baker, & Hadi Hosseini, Department of Psychiatry and Behavioral Sciences, Stanford University

Clare Kemmerer: *Women's Writing Groups: How Social Writing Empowers Women's Work*

Mentor: Leslie Berlin, Stanford University

Zachary Kirk: *The Fight Against ISIS and al-Qaeda: Another Hundred Years' War*

Mentor: Adam Yonkers, Palo Alto High School

Jasmine Larrick: *Enhancement of PD-1 Binding Affinity through Affinity Maturation and Mutagenesis*

Mentor: Bo Yu, Latrinx Bioscience

James Lee & Minyoung Kim: *Transforming Growth Factor Beta-Receptor I Inhibitor Optimization*

Mentor: Barry Hart, Innovation pathways

Sean Lin: *The Sports Revolution: Recognizing Intangible Abilities in Players*

Mentor: Matt Yun, Lockheed Martin

Jocelyn Liu & Tia Cheunkarndee: *Correction of DYSF Mutation Using CRISPER and hiPSCs Technologies*

Mentors: Elda Dzillc, Alice Shieh, & Sean Wu, Stanford University Cardiovascular Institute

Mengyu Liu: *Research of Differences Between Chinese and Western Music*
Mentor: Nancy Coffey, Palo Alto Unified School District

Timothy Liu & Ashley Zhang: *Accessibility of Academic Resources Outside of a School Setting*
Mentor: Lili Jiang, Quora

Michael Lu: *Realistic Synthesis of Musical Instruments and Performance*
Mentor: Malcolm Slaney, Google Inc.

Tara Madhav: *Studying the American Identity Through the Experiences of Ethnic Group from 9/11 Until Today*
Mentor: Jack Bungarden, Palo Alto High School

Yuval Medina: *Converting Music from Audio to Symbolic/Visual Representation*
Mentor: Malcolm Slaney, Google Inc.

Gautam Mittal: *From Text to Information-Using Natural Language Processing Technique to Glean Meaning*
Mentor: Robert Cheung, Independent Software Engineer

Erin Mittmann: *Analysis of the Efficiency of the PhotoVoltaic Test Bed and Its Feasibility as a More Permanent Power Solution*
Mentor: Wenonah Vercoutere, NASA Ames Research Center-Advanced Studies Laboratory

Chloe Mo: *Extraction of Risk Prediction Factors for Diseases Using Automated Literature Association*
Mentors: Bruce Ling and Yue Wang, Translational Medicine Lab, Stanford University

Charlotte Moffatt: *Better Living through Stress-The Effect of Environmental Stressors on Plant Metabolite Production*
Mentor: Max McGee & Jeong Choe, Palo Alto Unified School District

Khoa Nguyen & Xavi Loinaz: *Design/Utilization of Visual Recognition Software to Analyze Neurosurgery Video*
Mentor: Eric Sabelman, Kaiser Permanente

Cory Pan & Jessica Amalraj: *Optimal Chemical Environment for Algal Biohydrogen Production*
Mentor: Liz Martinez, Illinois Math and Science Academy & Alice Hahn, Gunn High School

Anisha Patwardhan: *A Door Long Unopened-Neighbor Estranged by the Economic Embargo in Cuba*
Mentor: Catarina Williams, League of Creative Minds

Naveen Ram: *Digital Splitter*
Mentor: Gianna Giancarlo, Hero Digital

Julian Rovee & Max Wang: *Modeling Wireless Communications*
Mentor: Minnie Ho, Intel Corporation

Nicholas Titzler: *Economical Analysis of Growth in Green Industry*
Mentor: Natasha De Caiado Castro, Wish Eventos

Samuel Vasquez: *Knowing Your Customer*
Mentor: Natasha De Caiado Castro, Wish Eventos

Jenica Wang: *Gene Panel Design for Early Cancer Detection*
Mentor: Xue Gong, Stanford University

Maritha Wang: *Engineering Sensitivity-Sensors for Toxic Gases*
Mentor: Harman Johll, National Junior College in Singapore

Celia Willner: *The Effect of Water Properties on the Reproduction Viability of Quagga Mussels.*
Mentor: David Willoughby, California Department of Water Resources

David Willner: *A More Cost Effective Application for Active Noise Control*
Mentor: Du Li, Hewlett-Packard

Emily Wong: *Learning to Publicize Global Citizenship and Cultural Sensitivity*
Mentor: Natasha De Caiado Castro, Wish Eventos

Jerry Xu: *Investigating the Effects of Different Types of Winglets on Fixed Wing Aircraft Performance*
Mentor: Jeong Choe, Palo Alto Unified School District

Justin Yang: *Generating Efficiency Models of Energy Consumption with Machine Learning Algorithms*
Mentor: David Kwak, Uber

Lena Ye: *Analyzing the Use of Words in Auto Industry*
Mentor: Peg Cain, Illinois Mathematics and Science Academy (retired)

Katina Yong: *Metabolites in Buckwheat Cultivars and their Anti-Microbial Properties*
Mentor: Angela Merchant, Henry M. Gunn High School

Sarah Youngquist: *An Analysis of the Combinatorial Game Princess and the Roses*
Mentor: Steve Chien, Google Inc.

Jonathan Zwiebel: *Development of Multistage Algorithms for Detection of Asteroids from CCD Arrays in Fixed Fields using Data from Kepler Spacecraft*
Mentor: Jessie Dotson, NASA Space Science and Astrobiology at Ames Astrophysics Branch

Part II: Palo Alto High Social Justice Pathway & AAR Collaboration Project

Social Justice Pathway (SJP) program at Palo Alto High School is a three-year program featuring self directed and project-based learning in an interdisciplinary model rooted in community action and collaboration. This program is for students interested in empowerment, conviction and the passion to build a better world. The SJP program was created and developed by Mr. Eric Bloom (history and social sciences teacher) and Ms. Erin Angell (English teacher). The SJP program is in partnership with DreamCatchers, which is an after-school program working to enable underserved middle school students reach to their full potential. This academic year, DreamCatchers worked closely with SJP students in mini-research projects with the intent of measuring middle school student confidence in Mathematics.

While the DreamCatchers' Executive Director, Barbara Sih Klausner (former PAUSD Board Member) and Program Director, Miguel Fittoria served as mentors, Ms. Deanna Chute (AAR Liaison and a math teacher) guided students through the statistical analysis of mini-research projects. Next year, AAR will use the curriculum Ms. Chute developed from these projects. This curriculum will guide future AAR students through projects that involve systematic statistical approach. In addition, all the SJP students who will be seniors next year will concurrently be enrolled in the AAR program, and will receive support and guidance needed to execute their capstone research project. This is an exciting collaborative effort that brings multiple programs together to provide students with meaningful real-world experiences.

The following are the Palo Alto High Social Justice Pathway and AAR Collaboration mini-research projects:

Jack Fitton, Jordan Quigley, & Sylvia Targ

Analysis of Question A1: "On a scale of 1 to 9, how would you rate your math skills?"

Maya Heron & Caitlin Drover

Analysis of Question B1: "When I come up with a solution to a math problem, I always ask myself, "Does this make sense?" And, when a classmate solves it a different way, I can understand his/her strategy, explain it to others and compare it to mine."

Kate DeAndre & Corinne Smallwood

Analysis of Question A2: "I often ask questions when I don't understand something."

Jeanette Andrews & Tanner Newell

Analysis of Question A3: "I often raise my hand to participate in class."

Jordan Schilling & Kira Enriquez

Analysis of Question B3: "Math teachers want you to learn, so they ask that you listen in class, follow instructions, do the classwork, study for tests and quizzes and turn in your homework on time. On a scale of 1 to 9, which best describes the effort you put into learning math?"

Ahana Ganguly & Joshua Donnelly-Higgins

Analysis of Question A4: "I like actively participating in group activities and discussions in class (Scale of 1 - 9)."

Rafi Long & Gillian Robins

Analysis of Question A5: "I can turn a word problem into an equation. I can also turn an equation into a word problem."

Alex Garcia, Quinn Knoblock, & Molly Weitzman

Analysis of Question A6: "I like learning new things in math. Sometimes I even do optional problems."

Nadia Leinhos, Avery Pearson, & Gregory Syssoyev

Analysis of Question A7: "I try to remember exactly what we did in class because it's Important to memorize the rules and formulas. A month or two after that lesson, I may forget how the rule works."

Sarah Sundermeyer & Matthew Seto

Analysis of Question A8: "Math is like a puzzle to me. In my head, I connect different math lessons because I can see how the topics fit together (Scale Range: 1-9)."

Yotam Ponte, Layla Solatan, & William Jeffries

Analysis of Question A9: "I estimate answers to problems before doing the calculations because I know it will help me get the right answer, and not because the teacher makes me do it."



ABOUT OUR PROGRAM

The Advanced Authentic Research (AAR) program strives to fulfill our mission of nurturing student interest and igniting student passion through real world, hands-on research enabling students to explore career pathways. The program innovatively adapts Career and Technical Education foundation standards in conjunction with Next Generation Science Standards for science and engineering practice, and our district's vision statement for students to explore topics in a wide variety of disciplines including STEM, Humanities, Business and Social Science fields. Advanced Authentic Research students bring passion, curiosity, and perseverance to the program.

For more information about AAR, please visit:
<https://aar.pausd.org>

For information about how to become a mentor, please visit:
<https://aar.pausd.org/mentor/register>

For information about student projects, please visit:
<https://aar.pausd.org/projects>

Thank you for your support!

