GREEN ROOM
S.T.E.M. ENRICHMENT PROGRAM
Social Innovation Challenge 2014

About the Green Room Planters

**Eric Cross, M.Ed. Curriculum and Instruction 14’**
A native San Diegan, when in middle school Eric was introduced to wonders of biochemistry through an internship program that targeted at-risk and minority students. From there his passion for science began. Prior to becoming a science teacher he spent several years consulting in both the nonprofit and private sectors. In 2011 he made the decision to move from success to significance by pursuing his dream of becoming an educator. Now teaching science at [Albert Einstein Academy](https://www.alberteinsteinacademies.org), an International Baccalaureate school located in metro San Diego, he’s been given the opportunity to combine his passion for STEM education with his business experience to launch Green Room. When he’s not in the classroom he spends his free time in the Crowley/Mammoth Lakes area hiking, fly fishing, and training for adventure races.

**Heike Paulsen, Ph.D. Chemistry**
Heike has been teaching science at [Albert Einstein Academies](https://www.alberteinsteinacademies.org) for the past 8 years. Initially she taught in 6th grade but for the past three years in 7th and 8th grade. If success can be measured by test scores, then she has successfully dispelled the myth that science is difficult because her students’ STAR test scores have improved every year. She is very passionate about science and the environment and believes that green chemistry and environmental awareness can be brought to the classroom. With new and emerging technologies linking the world, teaching science can be real-time and relevant. Not every student learns the same, but every student can have fun while learning science. It’s the classroom that needs to adapt. She is an ELL learner herself and understands the challenge of not understanding the language. Her belief in hands-on and edible science activities lowers the barrier for understanding science concepts.
**Vision**

Green Room addresses the social need of closing the achievement gap by providing a high quality, hands-on, research supported learning environment for socially disadvantaged students focused on Science, Technology, Engineering and Math (STEM). Green Room reshapes the learning experience to heighten student interest and improve achievement in STEM fields. With strategies based on the latest educational research, Green Room reimagines the physical learning environment, enhances current academic curriculum, and partners with local resources to create an inviting classroom, personalized learning and actively involved community.

**Overview**

Green Room is a STEM enrichment program designed to be embedded into a school’s existing science classroom. It begins at the middle school level by conducting a needs and resources assessment. After completion, teachers and faculty begin working with community stakeholders to raise financial support. The support campaign starts as a grassroots movement beginning with the parents of students attending the school, local community organizations and businesses. The petition for support then moves outward to local foundations, state grants and federal initiatives. During this process, future Green Room teachers are trained on the Green Room philosophy of education and curriculum, and are paired with a mentor during their first year. After their first year, Green Room teachers are expected to “pay-it-forward” by mentoring a future Green Room educator.

Once the startup capital has been raised by the school for lab equipment, transportation costs and classroom furniture, the program is largely self-sustained by the school’s existing science budget. Outside financial support would only be needed to make Green Room available at other schools. This removes any competition during the startup phase between schools for local financial support and helps promote a culture where teachers can actively advocate and support other Green Room programs. Educator collaboration is vital and encouraged with Green Room so that teachers can receive peer support, collaborate on new ideas, provide feedback and continually evolve and improve the program.

After the pilot program has completed its first year then the framework for creating future Green Rooms will be available for free online. This will include course curriculum, research data, local supporter contacts, videos, and marketing materials to raise support for new programs. Our philosophy, inspired by organizations like Khan Academy and Wikimedia Foundation, is that access to high quality STEM education should be available to all educators and students at no cost.

**Social Impact**

*Students:* Green Room seeks to do more with less. Since many working-class parents do not have the time or access to resources that would allow them to take their children to science museums, camps or other enrichment experiences, Green Room designs lessons and labs with local student areas in mind. Students can simply step outside on their street, or walk to their local park to participate in Green Room’s experiments, thereby making students aware of the scientific wonder that exists in their own backyards. It empowers teachers and administrators to promote changes in curriculum while working within the standards set by the state and federal governments. And because Green Room teaches to several learning styles simultaneously, English language learners, students with ADHD, and gifted students are better supported.
Year 1 impact - 200 students per/yr. (1 site)
Year 3 impact - 800 students per/yr, (4 sites)
Year 5 impact - 1200 students per/yr. (6 sites)

Families: Green Room is designed to be highly integrated within the local community. Therefore, parent and community stakeholders are essential to its success. During the school year students will create projects that address issues relevant to their home, community or local environment. “Parent Universities” will be held quarterly to demonstrate the Green Room curriculum, showcase student successes, and educate parents about specific ways they can assist with their children’s learning experiences. This unique partnership with parents will help bridge the gap that exists between many families and schools located in the inner city neighborhoods of San Diego. When parents better understand what is happening in the school and teachers are aware of what is going on at home, everyone benefits, especially the students.

Teachers: Green Room empowers local teachers to BE the change that they want to see in education by providing the resources and support needed to take student learning to the next level. Many teachers have the passion, knowledge, and dedication but lack to time create a new program from the ground up. With Albert Einstein Academy serving as the pilot site teachers will be able to reference our model to raise support for their Green Room program.

Community: The immediate positive impact will come from students creating and implementing projects that address environmental issues in their local neighborhoods. After spending a semester studying their local community, students will be able to conduct a needs analysis and develop an action plan that they will implement as a grade level project.

Measuring Impact and Success

- **Positive Community Stakeholder and Parent Feedback**: One of the key indicators of success will come from the responses of this group during the middle and end of the school year.

- **Improvement in Academic Performance**: During the Fall 2014 pilot program at Albert Einstein Middle School, student performance is regularly evaluated through formative and summative assessments based on International Baccalaureate (IB) standards throughout the school year. These assessments are sent to the IB World School site in Wales every other year for external verification of grading. An increase in student performance compared to previous years is expected, though test scores cannot be the sole indicator of learning. Student portfolios, individual and group projects and teacher observations will also be recorded and measured to provide a better understanding of academic achievement.

- **Increased engagement in extracurricular science activities**: Albert Einstein Middle School currently has one STEM club - Robotics - and has never competed in a science fair. One of our goals is to host our first science fair competition and have at least two students compete in the Great San Diego Science and Engineering Fair.
● **Student tracking through and beyond high school:** Students participating in the pilot program at AEAMS will be tracked through the district to evaluate progress and level of rigor of STEM courses taken.

● **Community action by students:** A goal for 2015 is for students to compete in their First Lego League robotics tournament at AEAMS, Botball tournament at AEAMS, Science Fair at AEAMS, participate in "Jugend forscht" a German based science project.

● **Student reflections:** Written reflections and surveys collected from students at several points in their secondary education will indicate how Green Room has impacted their level of scientific literacy and environmental worldview.

**What It Looks Like - The Physical Environment**

Education researchers and parents have long understood that children process information in various ways and that the current model of education, while adequate for some, does not address the different needs and abilities that students are bringing into today’s classroom. Abraham Maslow famously noted that if a person's basic need to be fed, safe, accepted and encouraged is not met then it will be impossible for them to reach a level where their full potential is actualized. This is especially true for working-class families living in underserved communities where many students do not have access to some of these basic needs. This puts a greater responsibility on local schools to create an environment where students can have these needs met while immersing students in an academically rigorous environment.

Another reason for remodeling the science classroom is supported by Howard Gardner’s theory of multiple intelligences which suggests that there are eight different learning styles that relate to how children learn best. These intelligences are musical, intrapersonal, interpersonal, logical, verbal/linguistic, auditory, kinesthetic, visual and naturalistic. A Green Room environment is designed to promote many of these multiple intelligences. Areas that allow for collaboration (intrapersonal) or individual work (interpersonal), computers and SmartBoards (visual), discussion areas (verbal/linguistic & auditory), labs (kinesthetic) and backyard science (naturalistic) are all represented in the classroom set up. Having a wide variety of learning spaces allows for all students to be successful in our classroom environment.¹ Green Room will redesign the physical classroom to create an environment where students will thrive in their learning by having:

1. **Discovery Zones/Learning Stations:** centers for learning in the classroom that allow easy access to a variety of learning materials in an interesting and productive manner. [Visuals](http://kaitlinronda.wordpress.com/2013/08/05/sketchup-your-classroom/)
2. **Dedicated Collaboration Stations:** in a collaborative learning classroom, students interact with others located around them.
3. **Lab Equipment:** equipment that can interface with iOS/Android/PC devices so students can do field work inside and outside the classroom.
4. **Flexible Furniture:** lightweight, flexible tables and chairs that facilitate multiple modes of working together in a quickly configurable environment so that students can interact with their peers and teacher.
5. **Cameras, Microphones, Headphones:** will be used for recording projects, lessons and presentations. Also supports students who miss class or want to review a lecture.

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¹ [http://kaitlinronda.wordpress.com/2013/08/05/sketchup-your-classroom/](http://kaitlinronda.wordpress.com/2013/08/05/sketchup-your-classroom/)
6. **Flash Drives:** students without access to internet at home can still access the lessons and watch the videos.

**Curriculum**
Imagine the Discovery Channel show, “Mythbusters,” where the show’s hosts learn by *doing*. In a Green Room classroom, the Next Generation Science Standards that have been adopted by the State of California are focused through the lens of **environmental science and technology**. Instead of learning about cell division and photosynthesis as abstract science facts, students will conduct experiments in the classroom relevant to what is happening in their own neighborhood. This experiential learning will be supported by a network of local professionals and university professors that specialize in specific STEM fields.

- Student-centric teaching
- Lab intensive with emphasis on environmental science and technology including renewable energy, air purification, sewage treatment, energy conservation, and green chemistry.
- High student engagement and collaboration
- Topics taught in a way that is directly relevant and applicable to student lives
- Experiential/Hand-on
- Mastery driven vs. simply test/performance driven
- Differentiated to support the learning needs of students with Individualized Education Plans, English language learners, students with ADHD, and gifted learners.

**Green Room 8th Grade Lesson Example:**

- Students will be presented with a 5-10 minute YouTube video starring their teacher to watch at home. The video will introduce a topic that students are encouraged to engage with immediately. For example, they might be asked to collect water and soil samples near their home and bring it to class the next day for analysis.

- The next day, students arrive with their water/soil samples and immediately begin using equipment to identify living organisms and conduct soil analysis. They enter their data into a Google doc that is projected on the main screen giving live updates of their findings.

- This document is then shared with a university professor also conducting research on water quality. Cameras are used to take photos of the various organisms and posted online. Teacher and students then collaborate together with science experts locally and abroad through Skype or Google hangout sessions to identify their discoveries. During the next phase students research the chemicals that were identified in their samples and their effects on the health of humans, plants, and animals.

- To showcase their learning, students choose from a variety of methods including live presentations, models, written reports, videos, skits and demonstrations.
Estimated Start-Up Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab equipment &amp; supplies Hardware (microscopes, sensors, gas chromatograph, NMR)</td>
<td>$10,000</td>
</tr>
<tr>
<td>Furniture</td>
<td>$1,000</td>
</tr>
<tr>
<td>Transportation (visits to local colleges, outdoor labs)</td>
<td>$1,000</td>
</tr>
<tr>
<td>Professional brand identity package including logo design, website design, programming and hosting, and printing of marketing materials</td>
<td>$3,000</td>
</tr>
<tr>
<td>Staff (teachers)</td>
<td>paid by school</td>
</tr>
<tr>
<td>Facility (classroom)</td>
<td>provided by school</td>
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Financial Plan

The startup costs for funding Green Room will be provided by Albert Einstein Academies, Community First Strategies and the Social Innovation Challenge. Once the initial operating costs are financed, the continued funding will be maintained by the school. All employee (teacher), facility, maintenance, website and science consumable costs can be incorporated into the existing school science and technology budgets with little to no increase in overall spending.

Financial Plan for Funding Future Green Rooms

The financial plan for expanding Green Room to other schools closely aligns with the funding model of the highly successful AVID program which began in 1980 by Mary Catherine Swanson at Clairemont High School San Diego. It started with just 32 students and now impacts more than 700,000 students in 4,800+ schools nationwide. Historically, school programs like Green Room draw from the five primary funding sources listed below. Schools would be responsible for raising their own funds to launch the Green Room program in their classrooms.

1. **District Funds:** Schools have budgets allocated for science classes. Depending on the district, these funds may or may not be sufficient to cover the full cost of start up, but should be sufficient for sustaining the program once it has been established.

2. **Federal Initiative & Title Funds:** Title I is a federal program that provides funding to local school districts to improve the academic achievement of disadvantaged students. It is part of the Elementary and Secondary Education Act.²

² [http://www.sandi.net/page/2408](http://www.sandi.net/page/2408)
3. **State Initiatives:** The Environmental Education Program has the primary purpose of supporting programs which will result in long-term educational benefits to potentially all California educators and/or students. The state legislature approved the allocation of Environmental License Plate Funds (ELPF) to the California Department of Education (CDE) to support the distribution of funds through the Environmental Education Program.³

4. **Foundations (Private & Corporate):**

   - **Girard Foundation** is a private, family foundation established in 1986. Their mission is to foster innovation and reform in K-12 education, with the goal of improving student outcomes in San Diego County. Their current focus is on digital learning, charter schools, college preparedness and educational leadership.⁴

   - **Classroom of the Future Foundation** advances public education throughout San Diego County by inspiring business, community and educational leaders to support, create and adopt innovative learning practices with enhanced instructional technologies that can measurably improve academic achievement.⁵

5. **Local Businesses & Individuals:**

   - **SDG&E Environmental Champions** supports nonprofit organizations whose programs promote environmental education, community engagement and stewardship to the K-12 populations of underserved communities in San Diego County and southern Orange County.⁶

   - **Families** of students directly impacted by the program will be the main supporters and advocates for its success. Although the primary demographic is low-income neighborhoods, many parents also have access to a larger community of friends, family, and professionals that are willing to support a program that benefits local education.

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³ [http://www.cde.ca.gov/pd/ca/sc/oeeintrod.asp](http://www.cde.ca.gov/pd/ca/sc/oeeintrod.asp)
⁴ [http://www.girardfoundation.org/current-priorities](http://www.girardfoundation.org/current-priorities)
⁵ [http://www.classroomofthefuture.org/](http://www.classroomofthefuture.org/)
# Project Milestones

<table>
<thead>
<tr>
<th>Month</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2014</td>
<td>Green Room is implemented in the 7th &amp; 8th grade science classrooms at Albert Einstein Academy. Partnerships have been formed through all major San Diego universities and 10 local businesses.</td>
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<tr>
<td>October 2014</td>
<td>First student led science club is formed.</td>
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<tr>
<td>Winter 2014</td>
<td>Students show increase in academic performance compared to previous school year; 75% parent attendance at open house; 50% parent attendance at Parent University.</td>
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<tr>
<td>December 2014</td>
<td>I am following up on my progress at the USD SIC event as a winner of the SIC.</td>
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<tr>
<td>Jan/Feb 2015</td>
<td>First AEA students compete in local science fair.</td>
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<td>Spring 2015</td>
<td>Students host and compete in 2 robotics competitions.</td>
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<tr>
<td>June 2015</td>
<td>Student performance and learning exceeds any previous year’s students at AEA as measured through quantitative and qualitative analyses.</td>
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<tr>
<td>Summer 2015</td>
<td>Data is compiled and posted to website. First group of students participate in summer STEM internship programs.</td>
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<tr>
<td>Year 2</td>
<td>Teachers and administrators are invited to observe Green Room; Our team presents on the program at local education events/conferences.</td>
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<tr>
<td>Year 3</td>
<td>Green Room is replicated in 3 schools.</td>
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<tr>
<td>Year 4</td>
<td>First Green Room students are seniors in high school. Data is collected on academic performance and education plans.</td>
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<tr>
<td>Year 5</td>
<td>Green Room is replicated in 5 schools.</td>
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## Current Partners/Supporters

<table>
<thead>
<tr>
<th>Supporters, Investors, Partners</th>
<th>Support Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albert Einstein Academies</td>
<td>Financial</td>
</tr>
</tbody>
</table>
| USD Science Department/Department of Learning and Teaching | Partnership  
Curriculum development, access to advanced biology/chemistry equipment |
| SDSU Science Department                          | Partnership  
Curriculum development, access to advanced Geology resources & Electron microscope |
| UCSD                                            | Partnership  
Curriculum development, access to biomedical resources, neuroscience |
| UCSD- Supercomputer Center                       | Partnership  
Curriculum development & training 3D printing |
| Mercedes of Carlsbad                             | Financial                        |
| House of Germany, San Diego                      | Supporter  
Engineering consultants |
| Scripps Institute of Oceanography                | Partner  
Curriculum development, access to ocean science specialists, equipment, & training. |
| Community First Strategies                       | Financial                        |
| Salk Institute                                   | Supporter  
Mobile Lab Facility |