Meeting Date: February 25, 2016

Information Only ___X___
Action Requested ______

Agenda Item Subject:  E-001 GHS Innovation Lab Update

Submitted by:  Chris Winters, GHS Headmaster
Sarah Goldin, Innovation Lab teacher

Document Summary/Purpose and/or Recommended Action: The report is an update on a pilot program with no action requested by the BOE at this time. The administration is also notifying the Board of the extension of the pilot for a 1 year period. When Innovation Lab was last presented in November 2014, the notification was that InLab was a pilot for the ’15-’16 school year.

For more Board of Education Meeting Information, Policies and Procedures, visit: http://www.boarddocs.com/ct/greenwich/Board.nsf/Public
I. Introduction

We founded the GHS Innovation Lab on the belief that the best way to experience school and learning can look different for everyone. Learning and brain research confirms a truly engaged student is a student who learns best. We believe individual teachers and students are doing innovative things in their classrooms every day to promote engagement and that this sort of innovation is what makes GHS an amazing place. Innovation Lab takes this one step further by creating a separate environment where four core subject areas are taught together, less inhibited by typical schedule constraints, in carefully designed projects and a curriculum that empowers students to pursue their questions and deeper knowledge in ways that might not be possible in a traditional classroom. We believe the design of Innovation Lab leads to engagement, and engagement leads to learning.

We are also organized around the unwavering belief that our students, our teachers and our school are successful when the conditions are right. We believe that the world and what it needs are changing. Our school needs to adjust to those changes. In order to meet these challenges, education needs to shift from a focus on information acquisition and memorization to a focus on the construction of knowledge through innovative problem solving, creativity and real world engagement. This shift is well underway at GHS and we hope to accelerate it in Innovation Lab.

Often change takes place from the ground up. Students and teachers can make this big leap by working together to reimagine what school might “look like” and “feel like.” This process of change involves just the right mix of optimizing what we already have and experimenting with entirely innovative approaches and structures, many of which have been implemented with success in other schools. We believe that Innovation Lab can become a laboratory where these new ideas take form and permeate the wider GHS community.

Please note that this report describing the first full semester of implementation of GHS Innovation Lab was written using the report submitted to the Board in November 2014 as a template. Thus, the structure and organization of this report are the same as that previously submitted. Throughout this document, paragraphs and items written in black font are consistent with the initial report and may contain minor edits. Paragraphs and items written in red font represent new information and data. In particular, Section H: Measuring Student Progress (below) contains extensive discussion of the currently available data for the metrics of student progress and program success originally outlined in our November 2014 report.
II. Program
A. Vision
The GHS Innovation Lab is a thoughtfully designed and flexible learning environment devoted to fostering creativity, curiosity, and purpose within an interdisciplinary and college preparatory curriculum. Teachers blend core disciplines in a project-based approach, allowing students to explore their interests and harness their innovative potential. This personalized approach to learning allows students to develop the skills and content knowledge they require by connecting to questions and topics of interest they identify. Students are encouraged to discover their passions and are supported as they make an impact in the community at large.

B. Foundational Principles
Research into high performing school models suggest we focus on the following principles:

- Flexible approach to the school schedule and school day
- Cross-disciplinary approach
- High levels of student-teacher collaboration and connection
- Student agency and ownership of learning
- Focus on metacognition: Students can explain the what, how, and why of their learning and gauge how they are doing
- Large common hub for all school activity
- Project-based learning
- Community involvement with real world internship/mentoring
- Regular public exhibition of student work as a means to accountability and assessment
- Choice within boundaries
- Writing and quantitative reasoning as requirements in every content area
- Technology as a dynamic tool for learning and as preparation for life
- Access to the resources available in the existing structure of GHS

C. Students
Innovation Lab is for students who:

- show improved academic motivation when given choice
- frequently attempt to connect their personal interests to the content they are learning
- prefer their learning to be interdisciplinary
- are motivated by real-world connections to their learning
- want a larger audience than teacher and classmates to show their work
- explore interests and questions without continuous prompting
- like to explore a topic in an unconventional way
- are willing to experience a student-led environment
- enjoy collaboration with others
- find the constant movement in the block schedule to be disruptive to their learning
D. Entry Year
In year one of implementation (2015-2016), we intended to accept up to 90 rising sophomores, approximately 15% of the Class of 2018. By the end of the 2014-2015 school year, we received a total of 82 applications for the inaugural cohort of GHS Innovation Lab. From those initial applications, a total of 50 students were formally enrolled in Innovation Lab for the start of the 2015-2016 school year. For various reasons, some students transferred out of Innovation Lab during the first cycles of the school year, such that a total of 43 students are currently enrolled in Innovation Lab. For the 2016-2017 school year, we intend to add a second incoming class of up to 90 rising sophomores and to add additional students to the rising junior class. By 2017-2018, we envision a maximum enrollment of approximately 270 students serving grades 10-12.

Students entering the program continue to be assigned to their GHS House and to work with their existing support staff, including house administrator, counselor, assistant dean, mental health professional, and special education staff.

E. Selection Process for 2016-2017 School year
All current Innovation Lab students are eligible to maintain their enrollment in Innovation Lab as Juniors for the 2016-2017 school year.

To be eligible to enroll as a new student to GHS Innovation Lab for the 2016-2017 school year students must:

1. Be a member of the GHS Class of 2019 or 2018.
2. Complete the online application Google form. (available via http://ghsinnovationlab.com/students/, please refer to Appendix A). The online application went “live” on January 4, 2016.
3. Submit an acknowledgement form signed by the student, his/her parent/guardian, and his/her GHS Guidance Counselor (See Appendix A).

Students new to Innovation Lab are also strongly encouraged to “shadow” current Innovation Lab students for part of a school day to learn more about Innovation Lab and its approach to learning. Students are directed to speak with their GHS Guidance Counselor or stop by Room 500 in downstairs Cantor to obtain an “in school field trip” form and schedule a shadowing opportunity in a manner that is minimally disruptive to the student’s current course schedule. Several students have already completed shadowing visits of approximately two hours in duration, visiting for one hour in the STEM (Science, Technology, Engineering, and Math) class plus one hour in the Humanities class (English and social studies). Several other students are in the process of scheduling such visits.

Current GHS Innovation Lab faculty hosted several evening information sessions to provide information to and answer questions from prospective students and parents. All information sessions began in the GHS Innovation Lab Common Room (Room 500 in downstairs Cantor)
and included a tour of the classrooms, a description of the program, and Q&A with faculty and current students.

**Parent and student information session dates:**
Monday, December 7, 2015, 7PM  
Tuesday, December 15, 2015, 7 PM  
Thursday, January 14, 2016, 7 PM  
Wednesday, January 27, 2016, 7PM

**Application Timeline:**
**Starting January 4, 2016:** Students complete online applications, conduct “shadowing” visits to learn more about Innovation Lab, and submit signed Signature Pages to their Guidance Counselor.  
**February 2016:** Students begin meeting with Guidance Counselors as part of the normal Course Enrollment calendar to confirm Innovation Lab enrollment and design student schedule.

As of February 6th, approximately 100-110 parents and students have attended formal information sessions, 15 students have completed the online application, and many more students have either completed or begun scheduling a “shadowing” visit.

**F. Teachers/Staffing**
Innovation Lab will be staffed at the current GHS teacher:student ratio (15.6 : 1). All teachers will be certified staff members and will work under current GEA contract. No additional staffing or certifications are required.

**G. Curriculum**
For the sophomore year, curricula covered by Innovation Lab students in their English, American history, and Algebra II (or next appropriate Math course in the sequence) courses will be the same as covered by students in the larger GHS community. A proposal for the Environmental Chemistry pilot course that aligns closely with the Next Generation Science Standards, which were formally adopted by the Connecticut State Department of Education on November 4, 2015 in a unanimous vote, was previously submitted to the Board. As discussed in detail in that previously submitted pilot course proposal, the laboratory-based, college preparatory Environmental Chemistry offers students a new take on classic topics in Chemistry, incorporating key concepts in both Earth and Life Sciences in order to align with the Next Generation Science Standards (NGSS).

For the junior year, curricula covered by Innovation Lab students will be the same covered by students in the larger GHS community, including

- British Literature and Short Fiction
- Civics and other Social Studies elective
● Physics
● Pre-calculus or Geometry (or next appropriate math course in the sequence)

In addition to their four core academic subjects, every student enrolled in Innovation Lab will be required to take Design Studio (Design Studio 10 for sophomores and Design Studio 11 for juniors), a PILOT course that will count as a Computer Arts credit. As discussed in detail in the previously submitted pilot course proposal, in Design Studio, students learn computer arts, communication, and professional presentation skills appropriate for the 21st century workplace. Such skills are developed through assignments that include: regular posts to an online professional blog, slide presentations, video conferences, interviews with professionals in the field, video production, and preparations for public exhibitions of student work. Students also learn how to use the technology related to scientific and mathematical modeling that will prepare them for a world where justification through data is essential. Students use engineering and build techniques to create visuals that are an extension of their work in core Innovation Lab classes. Design Studio will also prepare Innovation Lab students for involvement in the wider community by emphasizing life skills needed for college and career readiness such as preparing for interviews, participating in the exchange of ideas in a specific field, and maintaining collaborative relationships with peers.

The content and concepts of these courses will be presented in a way that helps students connect their learning to real world applications and their own interests. Teams of teachers will present interdisciplinary coursework through project-based learning.

For specific examples of how curricula for sophomore year Humanities (English and social studies) and STEM (math and Environmental Chemistry) have been organized and delivered, please see Appendices B and C.

H. Measuring Student Progress

Student Enrollment:
As a first measure of success of the proposed Innovation Lab PILOT, we have collected data on student self-selected enrollment. It was our goal that by February 2015, 80-90 current GHS freshmen would choose to enroll in Innovation Lab for their sophomore year, as measured by completion of application requirements and confirmation of Innovation Lab enrollment with their current GHS guidance counselor.

By the end of the 2014-2015 school year we had received at total of 82 applications for the inaugural cohort of GHS Innovation Lab. From those initial applications, a total of 50 students were formally enrolled in Innovation Lab for the start of the 2015-2016 school year. For various reasons, some students transferred out of Innovation Lab during the first cycles of the school year, such that a total of 43 students are currently enrolled in Innovation Lab.
Our aim is to grow Innovation Lab as a place for students of all backgrounds and abilities to pursue interdisciplinary, problem-based learning. As such it has always been our intent that the student body of Innovation Lab be reflective of the GHS student body as a whole. Our enrollment data indicate that we have been successful in that goal. As shown in Table 1 below, the Innovation Lab student body demographics are in close alignment with those of GHS sophomores as a whole. Notably, Innovation Lab serves minority, free/reduced lunch, 504, and Special Education students in similar percentages of such students in the GHS sophomore class as a whole. Similarly, as shown in Table 2 below, Innovation Lab core academic course levels (honors versus non-honors) also mirror those of the greater GHS sophomore class.

Table 1: Innovation Lab versus GHS sophomore class student demographics

<table>
<thead>
<tr>
<th></th>
<th>Innovation Lab Class of 2018 (n=43)</th>
<th>GHS Class of 2018 (n=615)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>53.5%</td>
<td>52.7%</td>
</tr>
<tr>
<td>Male</td>
<td>46.5%</td>
<td>47.3%</td>
</tr>
<tr>
<td>Minority</td>
<td>25.6%</td>
<td>34.8%</td>
</tr>
<tr>
<td>F/R lunch</td>
<td>14.0%</td>
<td>13.8%</td>
</tr>
<tr>
<td>504 Plan</td>
<td>4.7%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Special Education</td>
<td>11.6%</td>
<td>14.5%</td>
</tr>
</tbody>
</table>

Table 2: Innovation Lab versus GHS sophomore class Core Academic Course Levels

<table>
<thead>
<tr>
<th>Core Academic Course Level</th>
<th>Innovation Lab Class of 2018 (n=43)</th>
<th>GHS Class of 2018 (n=615)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Honors</td>
<td>Non-honors</td>
</tr>
<tr>
<td>Science</td>
<td>44.2%</td>
<td>55.8%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>32.6%</td>
<td>67.4%</td>
</tr>
<tr>
<td>English</td>
<td>60.5%</td>
<td>39.5%</td>
</tr>
<tr>
<td>Social Studies</td>
<td>60.5%</td>
<td>39.5%</td>
</tr>
</tbody>
</table>
**Student Retention:**
As a second measure of success, we will collect data on student self-selected retention. It is our goal that by February 2016, 80% of the first cohort of Innovation Lab sophomores will choose to continue their enrollment in Innovation Lab for their junior year as measured by confirmation of Innovation Lab enrollment with their current GHS guidance counselor. An additional goal is that 100% of any Innovation Lab “spots” within the class of 2018 generated by attrition will be filled by new applicants.

While these data are not yet available under the current GHS course selection timeline, data from our recent student and parent surveys indicate that we will meet this retention goal, as 81.4% of Innovation Lab students agreed with the statement “I plan to stay in Innovation Lab for my junior year.” Similarly, 100% of Innovation Lab parents agreed with the statement “I plan to re-enroll my child in Innovation Lab for his/her Junior year.”

Currently available data also suggest that we will be successful in adding new rising junior students to this initial cohort. 86.0% of current Innovation Lab students agree “I would recommend Innovation Lab to other Greenwich High School students,” suggesting that current students will act as ambassadors encouraging other current sophomores to apply. Notably, of the online applications submitted thus far for the 2016-2017 school year 20% are current sophomores.

**Student Interest and Engagement:**
A wealth of research shows that increased student interest and engagement is linked to student achievement (see References below, especially: Hulleman & Harackiewicz, 2009; Schiefele, Krapp, & Winteler, 1992; and Tucker-Drob, Cheung, & Briley, 2014). Our mission is to create an environment that maximizes student interest and engagement, and thus raises student achievement. We have created and administered surveys to measure Innovation Lab student and parent perceptions of student learning, engagement, and achievement. This anonymous survey employed a standard 5 point Likert scale for respondents to rate levels of agreement or disagreement with a series of declarative statements and also included opportunities for more spontaneous and unstructured feedback.

Our previously stated goal was for 80% of Innovation Lab students to show an increase in student engagement as per data collected on such surveys. Our survey data demonstrate that we have successfully met our goals for student interest and engagement. This success is demonstrated with the following **key findings from Innovation Lab student survey (n=43):**

- 83.7% agree: “I am happy with my decision to join Innovation Lab”
- 88.4% agree: “My parent(s)/guardian(s) are happy that I joined Innovation Lab.”
- 81.4% agree: “I plan to stay in Innovation Lab for my Junior year.”
- 86.0% agree: “I would recommend Innovation Lab to other Greenwich High School students.”
• 83.7% agree: “Participating in Innovation Lab has had a positive impact on my learning as a whole.”
• 95.3% agree: “I feel known and supported by the Innovation Lab teachers.”
• 86.0% agree: “I feel known and supported by the other Innovation Lab students.”
• 74.4% agree: “I enjoy coming to school.”
• 76.7% agree: “I am interested in what I study in school.”
• 79.1% agree: “As compared to my previous years in school, I think Innovation Lab is a better learning experience for me.”
• 72.1% agree: “As compared to what my sophomore year courses would have been had I not joined Innovation Lab, I think Innovation Lab is a better learning experience for me.”
• 76.7% agree: “I have improved my time management skills this year.”
• 90.7% agree: “I have improved my group work skills this year.”
• 81.4% agree: “I have improved my ability to learn independently this year.”

The unstructured comments provided by students also indicate a high degree of student engagement, satisfaction, and achievement as demonstrated by the following general student comments and feedback:

• “The teachers and system are willing to change whatever is necessary to allow the students in the lab to achieve the most optimal learning skills and availability reasonably possible. The learning processes of it actually makes me want to let the information get into my brain, rather than last year, had to forcefully push it in.”
• “So far, this year has been amazing. I have started to enjoy going to school again, which is something that I had lost during 9th grade. The way that classes are structured and how enjoyable they are makes school days fly by. It is an amazing feeling. At the same time I also feel like we have covered so much ground only a couple of months, in all subject areas.”
• “Innovation lab was a huge learning curve in the beginning of the year, it takes a while to get used to and it might seem like a lot at first but I never want to go back to traditional school. Innovation lab is for me.”
• “Innovation Lab has inspired change in my life.”
• “I like innovation lab and how it is mostly project based, and I feel that it will be a better experience in the long run.”
• “Some people may think that InLab is for people who can't learn, but that is the opposite. This is a program for people who are eager to learn new things in a different way, and that is why I love it.”
• “I think that it is nice that we create such a strong bond with our teachers due to having small classes. I also like how the teachers have our best interest at heart and try to encourage us to follow the path we are interested in though the work we are doing in class.”
“Last year was a tough year for me. Learning was difficult and I wasn't all that motivated. Last year compared to this year makes me feel comfortable. Everyone is moving at a different pace and time management is expected. It's nice.”

Similarly positive responses were provided by parents who responded to our optional parent survey (n=24). Thus, the success of the Innovation Lab PILOT is further demonstrated with the following key findings from the Innovation Lab parent survey:

- **100%** agree: “I am happy with my decision to enroll my child in Innovation Lab”
- **95.8%** agree: “My child is happy that he/she joined Innovation Lab.”
- **100%** agree: “I plan to re-enroll my child in Innovation Lab for his/her Junior year.”
- **95.8%** agree: “I would recommend Innovation Lab to the parents of other Greenwich High School students.”
- **87.5%** agree: “Participating in Innovation Lab has had a positive impact on my child's learning as a whole.”
- **91.7%** agree: “I feel that my child is known and supported by the Innovation Lab teachers.”
- **75.0%** agree: “I feel that my child is known and supported by the other Innovation Lab students.”
- **95.8%** agree: “My child enjoys going to school.”
- **95.8%** agree: “My child seems interested in what he/she studies in school.”
- **91.7%** agree: “As compared to my child's previous years in school, I think Innovation Lab is a better learning experience for him/her.”
- **95.9%** agree: “As compared to what my child's Sophomore year courses would have been had he/she not joined Innovation Lab, I think Innovation Lab is a better learning experience for my child.”

The unstructured comments provided by parents also indicate a high degree of student engagement, satisfaction, and achievement as demonstrated by the following general parent comments and feedback:

- “This has been a great experience for (student name). He said to us at dinner that it has been really challenging academically but also really valuable. He said his teachers all know him incredibly well and that they work really well collaborating. The group work has been great and he has gained great problem solving skills as well as gaining lots of experience with public speaking. He is still working on planning and time management but we have seen a lot of growth. We all feel like these are real world skills which will benefit him well into his future.”
- “This has been a fantastic year for my daughter (student name). She loves the program and so do I. I will be having my son, (student name), who is a freshman now apply to the program for next year. My daughter's grades are way better than they were last year and she and I couldn't be happier!!! Thank you thank you so very much for all you do!!!”
The entire family is thrilled and supportive of (student name)'s decision to enroll in InLab. We could not be happier with her progression and results. She's far happier this year with school in general and far less stressed. She's incredibly committed and engaged in her work and most importantly she is thoroughly enjoying her academic and social learning. The transition from the traditional classroom to InLab went relatively smoothly given it was very different from what she was used to. We are 100% confident in the effectiveness and enjoyment of (student name)'s participation in InLab. She is truly learning the material and able to apply her learning to real world events and understanding. We are so proud of (student name)'s commitment and accomplishments to date and are delighted she will continue on her InLab path throughout her tenure at GHS. We strongly believe it will serve (student name) extremely well in her university/college decision and help to differentiate her application in a very positive way. BRAVA/BRAVO for InLab administration and faculty for having the foresight, courage, determination and intelligence to envision and execute InLab's program and success. A world of gratitude to all involved.”

“Innovation Lab is preparing my child for real life: be accountable, responsible; a team player and an innovator.”

“(Student name) has commented that having 2 classes blocked together has taken an enormous amount of stress off of him. The two teacher tag team approach has also helped him stay on goal with the demands of the classes. Innovation lab has also worked exceptionally well hand in hand with resource room and the additional support that (student name) needs as a child with ADHD.”

“wholeheartedly support and value the Innovation Lab's ideals and thank you to the teachers and to Principal Chris Winters for your forward thinking in making this a viable option, and for looking beyond existing parameters while respecting the core curriculum of GHS which I think important.”

“Great individualized teaching. Low stress environment. Very engaging.”

“My child is curious and interested in learning again. I really like that it is not only repeating what the teacher told you on tests, but they have to do research and figure out things themselves.”

“My Child is more engaged with his learning than he was in his classes in freshman year. He is excited about what he is learning.”

“This experience has enlightened my daughter so much, she now has an eagerness to learn and work toward higher goals.”

“My son is very happy to go to school each day. He enjoys the inlab for several reasons, he likes the teachers VERY much, he feels engaged with the teachers and students and appreciates not being lectured to but being part of the learning process.”

“Innovation Lab has been a wonderful choice.... A welcome oasis in a landscape of more traditional offerings that we believe will not best prepare our children for their future. We also greatly appreciate that the teachers are so passionate and intent on knowing
each student as a learner. This is a key ingredient to the success of the program and helps develop independent yet connected learners.”

In addition, for Innovation Lab students with a history of attendance and/or disciplinary referrals, there are several school databases at our disposal that will be used to gauge improved student engagement. Our goal was that 80% of Innovation Lab students with a history of attendance issues will show improved attendance, and 80% of Innovation Lab students with a history of disciplinary referrals will show a decrease in such disciplinary referrals.

**Attendance data**
InLab students seemed to have fared better in attendance than those students in the larger high school, although numbers may be too small to be conclusive. Our students averaged 2.31 absences in class attendance as compared to 4.57 for the mainstream high school students. The average amount of unexcused absences this semester was 3.5, but three outlying numbers skewed the results. This figure is lower than the 4.6 average cuts for GHS students (excluding the alternative high school and CSP program). In addition, twenty-three of our students have one or zero unexcused absences. Twenty-six of our students (more than half of our enrollment) have two or fewer daily absences. Furthermore, only two of our students hit the loss of credit threshold; each in one class. These numbers reflect a more positive attendance record for the average Innovation Lab student as compared to the average student at GHS. Most importantly, each of our six students who struggled last year with attendance have shown marked improvement; two of these showed attendance issues declining by more than 50%.

**Conduct data**
This year InLab students made an appearance only five times on official conduct reports. All cases were classified as moderate disciplinary infractions. The total number of reported infractions for the high school is 181. This is an improvement from the 2014-2015 school year, when six of our students committed a total of eleven infractions; two of these were considered severe. Of these six students, five improved their conduct (83%). It is difficult to know for certain the cause of this improvement; often freshmen misbehave more than sophomores. It should be added that the majority of issues with InLab students are handled within the program and through a partnership between InLab teachers and House support staff. The teacher team has established a very transparent line of communication with students, parents, and staff to better ensure the success of our students.

**College and Career Readiness: Exhibition of Work, Portfolios and Reflection:**
A key part of college and career readiness is real-world problem-solving as demonstrated by regular participation in showcases—community exhibitions of work targeting an appropriate service, academic, or professional audience.
The construction of digital portfolios is rapidly becoming a necessity for students pursuing advanced learning and careers. The Coalition for Access is one example of a growing trend in higher education to look more closely at evidence of student work as a means to identifying qualified applicants.

**Exhibition of Student Work and Community Connections:**

Our goal was for 90% of Innovation Lab students to successfully participate in at least three community showcases each school year. **Thus far this academic year, 100% of Innovation Lab students have successfully participated in two public exhibitions of student work, and a third public exhibition of student work has been planned for March 2016.** It is anticipated that 100% of Innovation Lab students will participate in this third exhibition.

For the first quarter STEM Project on Air, Soil and Water, **100% of current Innovation Lab students participated in a video-conference** with students from Mid-Pacific eXploratory (MPX), a partner interdisciplinary project-based learning school in Honolulu, Hawaii. To prepare for the conference, Innovation Lab students were required to publish online reports describing the purpose, scope, and results of their projects. These reports were reviewed by the MPX students in advance of the conference. Similarly, Innovation Lab students reviewed the online descriptions of the MPX groups’ projects in advance of the conference and were required to prepare comments and questions. Student groups from each school were then paired to conduct an hour long Skype video conference during which they discussed the purpose, scope, execution, and results of their projects. As a direct result of this video conference many students have established ongoing professional relationships with the other students, as evidenced by becoming “followers” of one another’s professional blogs.

For the second quarter Humanities Modernism and STEM Self-Portrait Projects, **100% of current Innovation Lab students participated in a public Exhibition of Student Work held at the Bruce Museum on the evening of February 2nd.** For this exhibition students had from 1 to 3 pieces of work on display at the Bruce Museum, with the staging (including set-up, carpentry, and lighting) implemented with the full support and collaborative work of the museum’s professional staff. This exhibition represents the first of many anticipated collaborative experiences between Innovation Lab Students and the Bruce Museum, a preeminent non-profit that serves as a nexus for art, science, and culture in the northeast. During the Exhibition students explained the purpose of their projects, the process by which they were made, and the learning they gained as a result. There were hundreds of attendees and the event was widely praised by the Greenwich community at large. See, for example, the following articles that appeared in our local press:

- [InLab students exhibit at Bruce Museum](Greenwich Time)
- [Project-Based Learning at GHS Innovation Lab Culminates in Bruce Museum Exhibition](Greenwich Free Press)
Students have begun working on a Humanities project that will culminate in “community exhibition” in the form of entry in the National History Day Competition (see http://nhd.org/contest-affiliates/annual-theme/). **By March 1st, 100% of students will participate in an Innovation Lab History Exhibition consisting of a panel of local historians and experts in their chosen categories.** The exhibition will act as preparation for the official competition which takes place in mid-March. In preparation for this work, students in Humanities have already researched their topic, created a thesis statement, and begun initial preparations for their entry, including outlining their scripts for performances and documentaries, designing their exhibits, and finalizing the layout for their website. In addition, Tony Andrade, the Regional Coordinator of Fairfield County for National History Day, has conferenced with students on two separate occasions. Having students engage in a dialogue about their projects with an expert is an essential preparation for the final showcase, where students will face a panel of college professors, historians, and experts in their chosen category.

As a further measure of success in the explicitly stated goal of embedding ongoing community connections in the learning pursued within Innovation it is noted that **100% of Innovation Lab students have contacted at least one professional outside of Innovation Lab for the purpose of an assignment or project.** Examples of professionals in the field interviewed (either in person, by video conference, or via email) by Innovation Lab students in the course of their studies include:

- Dr. Roy Glauber - Nobel Prize winning Physicist, current Professor of Physics at Harvard University, and the last surviving member of the Manhattan Project
- Connecticut State Representative Caroline Simmons
- Connecticut State Representative Fred Camillo
- United States Senator for Connecticut Richard Blumenthal
- Jack Bryant - President of the Stamford NAACP
- Ella Dawson - TED Talk employee on the social media team
- Connie Leonard - Whole Foods marketing team
- John Reck - Director of Sales and Marketing, Karlsson Robotics
- Gloria Heath - Greenwich resident and member of the Women’s Airforce Service Pilots during World War II
- Robert Hunt - Andover, CT resident and World War II “D-day” veteran, 128th Engineer Group

As a further measure of success in the explicitly stated goal of embedding ongoing community connections in learning and instruction it is noted that Innovation Lab classes have also gone out into the community to learn, and have developed collaborative relationships with a variety of professionals and organizations within and around Greenwich, including:

- Field trip to and student exhibition at the Bruce Museum in Greenwich. Professional staff from multiple departments of the Bruce have visited Innovation Lab as part of the
preparations for the February 2nd Exhibition and to explore other opportunities for ongoing collaboration (as described above)

- Field trip to the **Grass Island Wastewater Treatment Plant** in support of the first marking period STEM Project, during which students got a tour of the plant from **process control Manager Dwayne Lockwood** and of the quality control lab from the head lab technician.

- Field trip to the **Museum of Modern Art** provided necessary learning and context for both Humanities and STEM Projects for the second marking period.

- **Leslie Yager of the Greenwich Free Press** participated in the Humanities Class to discuss Muckraking and Investigative Journalism. Subsequently, at Ms. Yager’s invitation an Innovation Lab Student published an article in the Greenwich Free Press (see [http://greenwichfreepress.com/author/julia-abbazia/](http://greenwichfreepress.com/author/julia-abbazia/)) and two other students are currently writing an article to be published in the coming weeks.

- **Tony Andrade, National History Day Regional Coordinator for Fairfield County** participated in the Humanities Class to guide students in crafting their projects for National History Day (as described above)

- **Travis Sluss, CEO and Owner of Macinspires**

- **Video calls from Brendan Coffey, GreenWave Deputy Director and Chief Operating Officer**, a social entrepreneur with a background in building sustainable businesses, to help design future Innovation Lab STEM Projects.

**Portfolios, Reflection and Academic Growth:**

Innovation Lab has successfully embedded both student reflection and portfolio management into the learning process. Our previously stated goal was for 90% of Innovation Lab students to construct and curate a portfolio of their ongoing project-based work, including metacognitive reflection upon the projects contained therein (descriptions of process and content learning). **100% of Innovation Lab students have an ongoing online professional blog to which they regularly post reflections on their work and learning (for content, process, and goal setting), descriptions of the projects they are completing, and links to documents in their “digital locker” representing the actual outputs of those projects.** A total of 14 separate required blog posts were assigned thus far this year, with some students completing posts in addition to the minimum required number. For links to the student blogs, please refer to [http://ghsinnovationlab.com/student-blogs/](http://ghsinnovationlab.com/student-blogs/) Please refer to **Appendix D** for the rubric used to evaluate student blogs, and which serves as a learning tool for conferences with students to improve blog quality.

We are also collecting data on students’ grade point averages. Our goal was for 80% of students to raise their grades in two or more core subjects by the end of the year. Currently available data suggests that we are well on our way toward meeting this goal. As of the end of Marking Period 1, 63% of current Innovation Lab students have already demonstrated the stated goal of raising their grades in two core academics (math, science, English, and social studies). In
addition, the overall average cumulative GPA for Innovation Lab students at the end of the freshman year was a 3.1. By comparison, the overall average marking period 1 GPA for these same Innovation Lab students was a 3.60, an increase of 0.5.

In recognition of the fact that GPA alone is not enough to indicate student success in the future, we will also measure student achievement by assessing Innovation Lab portfolios for evidence of both increased metacognition and increased conceptual understanding of subject content. Reflection is explicitly incorporated into both Humanities and STEM assignments and instruction on a weekly (and sometimes daily) basis. As discussed above, a total of 14 separate required blog posts were assigned thus far this year. Of these 13 had specific requirements for metacognitive reflection and 9 had had specific content reflection requirements. For specific examples, please refer to the student blogs, available via [http://ghsinnovationlab.com/student-blogs/](http://ghsinnovationlab.com/student-blogs/). As another example, for the second marking period STEM project, students have been required to complete a daily Project Journal in which they keep an ongoing record of their STEM project work. These Project Journals are assessed for accuracy and completeness for the following requirements: highly detailed entries reflecting all work on project both in and out of class, and including multiple photos and other images; entries contain details about specific concepts and topics learned; and entries include discussion of process, next steps, and time management plans. For the most recent time period assessed, the overall Innovation Lab average grade for these Project Journals was a B-, indicating solid progress by students in this metric with room for continued improvement in the second semester. Notably the Innovation Lab student survey (discussed in detail above) was itself an exercise in student reflection and metacognition, whose results demonstrate that students are able to describe their engagement with and approach to their own learning.

In the spring, Innovation Lab students will be expected to complete an end of year “Presentation of Learning” in which they present and reflect upon their portfolio for the year, and which will serve as the summative assessment for students’ overall growth in metacognition and conceptual understanding of subject content.

It is noted that student and parent survey data and responses (presented in detail above) demonstrate that Innovation Lab students are forming strong relationships with Innovation Lab as a whole, with the faculty, with other students, and with their own learning. **Students self-report strong gains in development of key 21st Century skills, including time management, group work, and ability to learn independently:**

- 76.7% agree: “I have improved my time management skills this year.”
- 90.7% agree: “I have improved my group work skills this year.”
- 81.4% agree: “I have improved my ability to learn independently this year.”

Evidence of student reflection upon and self-assessment of growth in each of these areas is strongly documented in the various student blogs, available via
Please refer, in particular, to student reflections upon the Bruce Museum Exhibition of Work.

**Standardized assessments:**
State-mandated standardized assessments (CAPT Science) and other nationwide standardized tests (such as SAT) are commonly used metrics of student achievement. However, this report to the Board is occurring well in advance of availability of student performance scores for such assessments. For example, 2016 CAPT Science score will not available until August 2016 at the earliest, and students will not take the SAT until March of their junior year. Thus, these standardized test scores do not constitute a significantly useful metric for evaluating the Innovation Lab pilot. Nonetheless, we plan to track and monitor student performance on standardized, means-tested exams such as CAPT Science (and whatever NGSS-aligned science exam replaces CAPT) and SAT.

In the interim, preliminary data can be provided concerning student performing on Science Department CAPT aligned benchmarks. In the first week of September, a departmental CAPT-aligned benchmark was administered to gather baseline data regarding student progress towards meeting CT State Science Content and Inquiry Standards. On this baseline benchmark, Innovation Lab Environmental Chemistry students (n=41) scored an average of 73.41%, with 41.5% of students scoring 90% or higher on the test, 26.8% students scoring in the range of 70-80%, and 31.7% of students scoring a 60% or lower. Thus, baseline measures indicate various performance levels for students (consistent with the heterogenous grouping model of the Innovation Lab STEM class).

A second department CAPT-aligned benchmark was administered in mid-November, partway into the second marking period, and after the completion of the first STEM Project in Innovation Lab. On this second departmental benchmark, Innovation Lab Environmental Chemistry students (n=43) scored an average of 78.84%, with 53.4% of students scoring 90% or higher on the test, 25.6% students scoring in the range of 70-80%, and 20.1% of students scoring a 60% or lower. These data demonstrate that average student performance on science department CAPT-aligned benchmarks has increased by 5.43%, the percentage of students scoring at the highest level (score of 90% or above) has increased by 11.9%, and the percentage of students scoring at the low level (score of 60% or lower on benchmarks) has decreased by 11.6%. Thus, available data indicate strong gains by Innovation Lab students towards meeting state performance standards as measured by the CAPT Science test.

Following the district lead to assess students through multiple measures, in addition to the tools explained above, Innovation Lab students will take the STAR assessments in Reading/Language Arts and Math along with their GHS classmates. In 2015-2016, GHS administered STAR assessments to freshmen only, thus data are not yet available for Innovation Lab sophomores. In
future years, the STAR assessments will be a beneficial additional tool for measuring progress and comparing Innovation Lab student progress with that of greater GHS.

**Additional observations and evidences regarding Innovation Lab implementation:**
Other observations and evidences pertinent to demonstrating the success of the Innovation Lab pilot include:

- Innovation Lab has developed ongoing collaborative relationships with a variety of schools and programs that also pursue interdisciplinary project based learning, including:
  - The Springfield Renaissance School in Springfield, MA
  - Mid-Pacific Institute in Honolulu, HI
  - iSchool in New York, NY
  - High Tech High School in San Diego, CA
  - Newton North High School’s “Greengineering” Program in Newton, MA

- Innovation Lab has been contacted and/or visited by a variety of other schools seeking to learn from our approach, including:
  - Mount Vernon School in Atlanta, GA
  - Darien High School in Darien, CT
  - Staples High School in Westport, CT
  - Lauralton Hall Catholic School for Girls in Milford, CT
  - Pine Point School in Stonington, CT
  - Scituate High School in Scituate, MA
  - Blind Brook-Rye Union Free School District in Rye, NY
  - The Stanwich School in Greenwich, CT

- Student agency and voice is promoted by biweekly “Town Hall Meetings” during which Innovation Lab faculty and students come together for lunch to discuss areas of student concern and to participate in joint decision making.

- The Innovation Lab team approach to planning and teaching is a highly effective RTI mechanism, as faculty confer regularly about students to develop and implement strategies to support students academically, emotionally, and socially. Communication with guidance counselors, school psychologists, and social workers (where necessary) is frequent and purposeful.

- Innovation Lab faculty report anecdotally that students and parents are more proactively communicating concerns and issues (as compared to faculty experiences with prior teaching outside of Innovation Lab), enabling more comprehensive, timely, and coordinated interventions and responses. These anecdotal observations are supported by survey results (presented in detail above) in which students and parents both report feeling known and supported by Innovation Lab faculty.
**College Process:**
We have already begun collecting data on the likely impact of the Innovation Lab experience on the college applications process and college readiness of our college-bound students. We have obtained from the GHS Career Center Counselor (via the Naviance database) a list of every post-secondary institution (college or university) to which 20 or more GHS students have applied within the past three years. We are in the process of contacting the directors of admission for all of these institutions. Institutions with which we have spoken (~30 minute teleconferences) thus far include (amongst others) New York University, Fordham University, the University of Pennsylvania, the University of Vermont, Boston College, Boston University, the University of Rhode Island, the University of Connecticut, and Yale University. In every case these directors of admission have expressed support for the structure and philosophy of the interdisciplinary, project-based, student-driven learning style to be pursued in Innovation Lab. Specifically, admissions staff from all of these schools have expressed that Innovation Lab curricula and project-based learning illustrated appropriate rigor that would not disadvantage students seeking to apply to competitive colleges and universities.

Comments from Admissions Officers at the above institutions include the following:
- “I can’t wait to see how it develops.”
- “It sounds like your program continues to have a really strong academic component to it.”
- We are looking for “effective communicators... communication is huge… in print, digital, or performance forms.”
- “What you are trying to achieve has relevance on this campus.”
- “We don’t see enough intellectual risk-taking.”
- “[We are] looking for students who are excited about bumping up against ideas that are unfamiliar... and grappling with that.”
- “There’s a lot of great philosophy and thinking going on behind this.”
- “It sounds like you’ll be doing some really interesting things.”
- “[It] sounds like you are on a difficult but worthy endeavor.”

Further progress reports will be completed and distributed to the Board of Education at the end of the school year 2015-2016. Informal updates are, of course, available as needed upon request.

**I. Leadership**
Innovation Lab is run day-to-day by a collaborative committee of teachers. All other issues are handled by House support staff. As discussed above, students entering the program continue to be assigned to their GHS House and to work with their existing support staff, which includes house administrator, counselor, assistant dean, mental health professional, and special education staff.
J. Integration with GHS

1. Courses
Innovation Lab students take World Language; Health and Wellness; Physical Education; and elective courses (across the entire GHS offering) within greater GHS. Enrollment data confirm that Innovation Lab students are taking the full range of courses available at GHS. All students are enrolled in the required health, wellness and physical education classes. Innovation Lab students are enrolled in a total of 20 different World Language courses, including offerings as diverse as Latin 1, American Sign Language 2, Italian 2, Mandarin Chinese 3, Spanish 5, and AP German Language and Culture. Similarly, Innovation Lab students are enrolled in a total of 36 different elective courses, including offerings as diverse as Intro to Ceramics, Intermediate Photography, Entrepreneurship, Cardinal Cooks, Concert Band, Honors Madrigals, Intro to Electronic Music, 3D Computer Graphics, Astronomy, Comedy Improv, and Honors Advanced Theater.

2. Extracurriculars
Students have full access to all before and after school activities, including athletics. Innovation Lab is actively supporting and expanding the extracurricular offerings at GHS. Innovation Lab faculty are advisors for 4 different clubs that meet within Innovation Lab classrooms, including the Vocal Club, Greenwitch, the Robotics Club, and the AIM (Addressing International Misfortune) service club. Innovation Lab Makerspace equipment and materials (as funded by a Greenwich Alliance Reaching Out Grant, described in detail below) are used regularly by the GHS Robotics Team in the design and build of their FTC Competition Robot.

3. Schedule
Five blocks of Innovation Lab students’ schedules are allotted to Innovation Lab. Unlike a set of five blocks in greater GHS, the five hours in Innovation Lab are more flexible. A student’s English and social studies blocks are scheduled back-to-back, and delivered as one co-taught double block Humanities class. Similarly, a student’s math and science blocks are scheduled back-to-back, and delivered as one co-taught double block STEM (Science, Technology, Engineering, and Math) class. This structure allows for greater flexibility in instruction and learning as students and teachers can allocate that larger span of time as needed on a day-to-day basis. Within each double-block class, students are heterogeneously grouped in that different course levels are scheduled within the same block. For example American History 212 and American History 213 students are scheduled in the same double block Humanities class, and Honors Environmental Chemistry and Environmental Chemistry students are scheduled in the same double block STEM class. Students pursue their greater GHS courses (World Language, health and wellness, physical education, and electives) according to the current rotating block schedule. Illustrative examples of actual current Innovation Lab student schedules are summarized in Table 3 below.
Table 3: Sample Innovation Lab Student Schedules:

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Student A</th>
<th>Student B</th>
<th>Student C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resource Room</td>
<td>Design Studio 10</td>
<td>Fitness 10 3X / Open 3X</td>
</tr>
<tr>
<td>Block 2</td>
<td>Design Studio 10</td>
<td>Latin 1</td>
<td>Honors Spanish 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block 3</td>
<td>Humanities</td>
<td>STEM</td>
<td>Humanities</td>
</tr>
<tr>
<td></td>
<td>(English 212 IL + American History 212 IL)</td>
<td>(Algebra 2A IL + Environmental Chemistry IL)</td>
<td>(English 213 IL + American History 213 IL)</td>
</tr>
<tr>
<td>Block 4</td>
<td>STEM</td>
<td>Fitness 10 3X / Open 3X</td>
<td>STEM</td>
</tr>
<tr>
<td></td>
<td>(Algebra 2A IL + Environmental Chemistry IL)</td>
<td></td>
<td>(Honors Algebra 2 IL + Honors Environ Chemistry IL)</td>
</tr>
<tr>
<td>Block 5</td>
<td></td>
<td>Baking and Pastry Art</td>
<td></td>
</tr>
<tr>
<td>Block 6</td>
<td>Fit 10 3X / Open 3X</td>
<td>Humanities</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(English 213 IL + American History 213 IL)</td>
<td></td>
</tr>
<tr>
<td>Block 7</td>
<td>Spanish 5 Native</td>
<td>Honors Adv Theater 3X / Open 3X</td>
<td></td>
</tr>
<tr>
<td>Block 8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. AP classes
After conversations with admissions officers (see as described in detail in Section H above) from prestigious Ivy League schools including Yale and University of Pennsylvania, as well as other GHS favorites such as NYU, Boston College and University of Vermont, we have concluded that it is in the students’ best interest to set a hard limit on the number of AP courses Innovation Lab students may take. Admissions officers expressed that Innovation Lab curricula and project based learning illustrated appropriate rigor that would not disadvantage students looking to apply to competitive colleges and universities. As a result, it is our decision that Innovation Lab students only be offered one AP class in their senior year. Innovation Lab students may opt to take any of the Innovation Lab core subjects at the Honors level. Innovation Lab students may take AP elective courses and/or AP World Language courses. For example, current Innovation Lab students are enrolled in AP German and Culture and AP Spanish Language Native and Culture.

5. Impact on other programs/courses
It is anticipated that student enrollment in Innovation Lab will NOT impact total school billets or individual teacher student load. It is anticipated that Innovation Lab will have no impact on enrollment in World Language, Health and Wellness, or Physical Education courses, and minimal impact on enrollment in elective courses. It is anticipated that enrollment will shift a total of 4 sections of each core academic (English, math, science and social studies) from greater GHS into Innovation Lab for each class year enrolled (ie. for 2016-2017, 4 each for sophomores and juniors).
6. Space/classrooms
Innovation lab is located within downstairs Cantor House. Innovation Lab currently occupies three rooms: Room 500 as a large Common Area and room for the Design Studio class, Room 516 as the Humanities Room, and Room 517 as the STEM Room. The total number of downstairs Cantor classrooms allocated to Innovation Lab will shift based upon student enrollment. GHS anticipates that Innovation Lab will have no impact on overall GHS room occupancy.

K. Budget and Funding

1. Partnership with the Greenwich Alliance
For school year 2014-2015, Innovation Lab research and development was funded through a Greenwich Alliance Reaching Out Grant. This grant funded five half-time release positions for five teachers (1 each from math, science and English, and 2 from social studies).

For school year 2015-2016, a Greenwich Alliance Reaching Out Grant funded: creation of an Innovation Lab Makerspace (including tools, equipment and materials); purchase of a variety of Vernier data acquisition devices and sensor probes used for STEM projects; professional development expenses for faculty attendance at training and conferences about project-based learning; and a 0.25 release position for Research and Development for junior year Innovation Lab Physics instruction.

The Greenwich Alliance has encouraged us to apply for additional smaller scale Reaching Out grants, as per the mechanisms available to any other GHS program, for potential ancillary funding not available under the current GHS budget.

2. Ongoing Budget and Financial Model
As stated from the outset, after the research and development stage, the Innovation Lab will operate within the BOE per pupil ratios for staffing and operating costs. Innovation Lab teachers will work under the GEA contract.

3. Instructional materials and/or instructional technology
The district implemented one-to-one computing devices during school year 2015-2106. Therefore, computing and technology needs for the Innovation Lab pilot are already being addressed within the current GPS budget. Additional software and databases needed to execute the Innovation Lab PILOT PROGRAM are predominantly available via free online platforms and/or for free downloadable use by educators (for example, the Desmos graphing calculator at https://www.desmos.com/calculator, the Graphical data collection and analysis application for Chromebook by Vernier, the PubChem database available via the National Center for Biotechnology Information, and the free “Eyes on Earth” app available from NASA).
Similarly, many of our reading material and textbook needs are already met by print and electronic resources available through the GHS Media Center and/or may be met via free online resources, including e-books available for free from iTunes (for example, Environmental Toxicology and Chemistry by Wiley Publishing available from the App store) and databases of free online peer-reviewed science journals (such as PubMed Central available via the National Center for Biotechnology Information).

It is anticipated that hard copy textbook, teaching supplies, instrument and equipment expenses will be met under the present GHS departmental operating budgets and will not require any additional budgeting.

L. References


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Appendices

Appendix A: Online Application and Application Signature Form

Appendix B: Sample Plans for Humanities Projects
  Appendix B1: Humanities Sample Assignment Sheet - Project One: Become a Modern Day Muckraker
  Appendix B2: World War II Voices of America

Appendix C: Sample Plans for STEM Projects
  Appendix C1: STEM Self-Portrait Project Overview and Project Map (quarter 2)
  Appendix C2: Sample math assignment from STEM Self-Portrait Project (quarter 2)
  Appendix C3: Sample Environmental Chem Assignment from STEM Self-Portrait Project

Appendix D: Rubric for Innovation Lab blog posts
Appendix A: Online Application and Application Signature Form

GHS Innovation Lab Online Application (2016-2017 School Year)
This form should be completed by the student. Students who will be sophomores or juniors in Fall 2016 are eligible. Allow about 15 minutes to complete this form.

* Required
First Name: *
Last Name: *
Next year, I will be a __________ . *
Guidance Counselor: __________ . *

Think about who you are as a student. Then, for each of the following statements, rate the extent to which you agree or disagree.

I feel more motivated in school when I get to choose what I study. *

I frequently connect things I am learning to my personal interests. *
I am more comfortable when teachers give me very specific instructions for assignments and projects. *
I prefer to have teachers explain things to me directly. *
The high school's rotating block schedule makes it hard for me to stay focused. *

Which of the following statements best represents your attitude in working with groups? *

- I don't like working with groups.
- I like working in groups because I feel like it's less work for me overall.
- I like working in groups because I enjoy learning from other people.
- I like working with groups when I'm not the leader.
- I like working with groups when I am in charge.
- I prefer to work alone, but can work with groups.
- I like working with groups when my friends are with me.

Please complete each statement.

I feel really motivated when __________ . *
If I could make one change in the world, I would __________ . *
When I get stuck on an assignment, I __________ . *
The thing I learned over the last year that I thought was the most exciting/interesting/meaningful was __________ . *

These responses will be a little bit longer. Thank you!
Describe why Innovation Lab might be a good fit for you. Please provide your answer as a complete paragraph of appropriate length.
What questions do you still have about Innovation Lab?
GHS Innovation Lab Application (2016-2017 School Year)

Thank you for your interest in Greenwich High School’s Innovation Lab!

We look forward to learning more about you and your educational goals. In order to complete your Innovation Lab application, please acknowledge that you, your parent/guardian, and your GHS guidance counselor have read and agree to the following information by signing below.

To apply to join Innovation Lab for the 2016-2017 school year, students must:

1. Be a member of the GHS Class of 2018 or 2019.
2. Complete the online application Google form in its entirety (available via [http://ghsinnovationlab.com/students/](http://ghsinnovationlab.com/students/)).
3. Submit this form as signed by the student, his/her parent/guardian, and his/her GHS Guidance Counselor.

Students are strongly encouraged to “shadow” current Innovation Lab students for a day to learn more about Innovation Lab and its approach to learning. Please speak to your GHS Guidance Counselor or stop by Room 500 in downstairs Cantor to learn more about scheduling a visit.

If you or your parent(s)/guardian(s) have any questions about Innovation Lab or the application process, please contact us at GHSInnovationLab@greenwich.k12.ct.us.

Sincerely,
GHS Innovation Lab Team

We have read and agree to all of the GHS Innovation Lab application process instructions as described above.

_______________________________________   _______________________________________
Print student name     Student signature

_______________________________________   _______________________________________
Print parent/guardian name               Parent/guardian signature

_______________________________________   _______________________________________
Print GHS guidance counselor name              Guidance counselor signature
Appendix B1: Humanities Sample Assignment Sheet

Note: Each assignment contains more explicit directions in a separate document.

Project One: Become a Modern Day Muckraker

Are there governmental solutions to the most pressing issues currently facing America?

You will create a 5-7 minute investigative news report on a controversial issue in America. The purpose of your report is not simply to educate your classmates, but to persuade them to agree to a specific course of action. With this in mind, your report must incorporate a variety of rhetorical devices including ethos, pathos, and logos and use both written and visual sources.

Assignment #1: Use History.com to complete Assignment #1: “Background Research” for your research term.
- Bring in answers of Who?, What? Where?, When? to share with your group

Assignment #2: Define the problem your group will seek to find a solution for.

Assignment #3: Use Google image search to complete a “Visual Analysis” for your research terms.
- Share visuals with your classmates and complete a rhetorical and historical analysis.

Assignment #4: As a group, create an online textbook for your topic.

Assignment #5: Use GHS Media Center databases to complete a “Statistical Analysis” of your topic.
- Bring in your infographic to share with your group

Assignment #6: Use GHS media Center databases to complete a “Journalism Analysis” for your topic.
- Bring in to share with your group

Assignment #7: Conduct an interview with an expert about your topic.

Assignment #8: With your group, propose a solution that answers the question you initially started with.
- Anticipate counter arguments to your group’s solution.

Assignment #9: Write your script and organize pictures, infographics, and clips from interviews using Ethos, Pathos, and Logos.

Assignment #10: Record your video using WeVideo.

Research Groups
Each group member is responsible for becoming an expert on their chosen topic.

**Poverty**
Jane Addams and Hull House
The Revenue Act of 1913
Income Tax Today
Poverty Today (Local, State, National)

**Workers Safety & Rights**
Triangle Shirtwaist Factory
Anthracite Coal Strike
Minimum Wage Debate
Bangladesh Factory Collapse

**Racial Equality**
Booker T. Washington vs. W.E.B Dubois
NAACP
Michael Brown & Black Lives Matter
Racial Imbalance in Greenwich Public Schools

**Gender Equality**
19th Amendment
Margaret Sanger
Planned Parenthood Debate
Equal Pay Act

**Food and Environmental Regulation**
Pure Food and Drug Act of 1906 & Meat Inspection of Act
Newlands Reclamation Act of 1902 and Roosevelt's Conservation Policies
US Response to Global Warming
Factory Farms Today and use of GMOs

**American Foreign Policy**
American Intervention in Cuba and the Philippines
Building of the Panama Canal
American Response to Conflict in Syria
America and ISIS
Appendix B2: World War II Voices of America

Note: The following mini-project is an example of required curriculum being blended with the goals of the DLE and skills required to complete the final exhibition (for students interested in the website option) of the National History Day Project. The “voices” students researched included African-Americans, Native-Americans, Mexican-Americans, Jewish-Americans, and Japanese-Americans.

Creating a Website for our NHD Activity: Voices of America during WWII

Websites can display materials online, your own historical analysis as well as primary and secondary sources. Websites are interactive experiences where viewers can play music, look at a video or click on different links. Viewers can freely navigate and move through the website. Websites use color, images, fonts, documents, objects, graphics and design, as well as words, to tell your story.

Assign Jobs and Complete Today’s Checklist:

- Create a Weebly.com account and select a website title with humanitiesghs and your topic
- Add all group members as editors
- Choose an appropriate background
- Create a title and subtitle (use language from your readings)
- Have the first names of group members (last initial as needed) listed
- Collaboratively formulate arguments and thesis statement before working on individual job

Jobs:

About/Summary/Homepage Designer:
- Write a brief paragraph introduction to your topic. Include a thesis in the last sentence.
- Pair it with an image that fits the content.

Primary Source Master (Argument #1)
- Find a link to at least THREE primary sources to support your argument.
- For each link, include a quote from the source and a picture that relates to the quote.
  Underneath, write a brief explanation about the significance and how it relates to your argument/thesis.

Videographer (Argument #2):
- Find three videos that support your argument.
For each clip, write a brief explanation about the significance and how it relates to your argument/thesis.

**Image Gallery Artist (Argument #3):**

- Find three images that support your argument. Please be sure to cite each one.
- For each image, choose a quotation from your reading that relates to the content. Underneath, write a brief explanation about the significance and how it relates to your argument/thesis.

**Connection-to-Today Professor:**

- Find at least three current events articles that relate to your topic.
- Write a brief paragraph introducing the viewer to the sources and why you chose them.
- For each article, find a picture and choose a quotation from either your reading or the article that sheds light on the meaning.

Use the checklist to make sure that you have completed all aspects of the activity.
Appendix C1: STEM Self-Portrait Project Overview and Project Map (quarter 2)

In the social jungle of human existence, there is no feeling of being alive without a sense of identity.
-Erik Erikson

STEM Self-Portrait

Identity
Our identity defines our role and place in the world and we all express it a little differently. One such way is a self-portrait - a lens through which both we and others can see us. Science and math are humans’ attempt to explain and quantify phenomena in our surroundings, but how can they be used to represent our unique identities?

STEM
The selfie has revolutionized self-portraits; before the recent invention of the front-facing camera, we used to hold a normal one backwards. Before cameras, trained artists would spend countless hours painting their own likeness on paper, canvas, or even cave walls. The advent of color photography, disposable cameras, and now digital photography has us taking more selfies than ever. Regardless of the medium, though, color has been an important part of our self-portraits. Mixing pigments to make paint, burning specific materials to create colored flame, and creating devices that can display millions of colors - these are all technological advances that allow our eyes to see ourselves just a bit more clearly.

But what even is a selfie? It’s an instantaneous interpretation of ourself. We often use art as an expression of self and the images we use can be drawn, sculpted, or - why not? - even represented with mathematical equations. Our identities are similar; at a glance, we often seem as alike as shades of a color. Upon further examination, we are as diverse as the full spectrum. How we choose to represent these differences is the basis for our self-portrait.

The Essential Questions
● How do I define myself and my place in the world?
● Who am I and how do I relate to others?
● How can I represent myself to others?
● How can mathematical functions create artwork?
● How can we manipulate properties of matter to create physical pieces of art?
● What is “color”?
Project Description

For the STEM Self-Portrait, students will create paired digital and physical pieces of art that represent alternate interpretations of an image of their identity.

The digital piece will be an original student artwork inspired by cubism, a type of art where objects are broken up and reassembled to create a piece of art that views the subject from differing viewpoints. This piece of art should include all or some of the aspects of the sense of self that are found in the physical piece of the self-portrait. The final product will then be created in Desmos, a mathematical interface. In order to create this digital piece, students will apply underlying concepts of math, including domain, range, transformations, and a wide range of functions.

The physical piece may be static artwork or contain moving and/or changing components. Students will present their piece with an accompanying technical explanation of the underlying STEM concepts, including a detailed examination of the matter of which it is composed, explanation of how and why the chemical elements of the piece create the visual effect(s) that they do.

The Requirements

1. Digital piece:
   - must be based on a unique piece of art inspired by cubism and an image of the student’s identity
   - the art, or a piece of it, will be recreated in Desmos (examples)
   - must include a number of different functions based on math course and level
   - functions must be restricted by the appropriate domain and range limits
   - explain intercepts and show, by hand, why they are consistent with the graphs
   - written explanations based on analysis of prior student work (online examples):
     - inequalities and shading should be used to provide color (and should be explained)
     - systems of equations will be solved by hand and using available technology
     - students must explain transformations in their own piece

2. Physical piece:
   - must be based on a unique piece of art inspired by an image of the student’s identity
   - must display two or more visible colors (beyond black and white)
   - must include a number of different substances and be made using and/or perform a number of physical and/or chemical changes based upon course level
   - required technical explanations* will include descriptions/explanations of:
     - the chemical composition, properties, and manufacture of major substance(s);
- the physical and/or chemical change(s) incorporated in the piece; and
- the predominant visual colors of the piece.

* Please note that the exact requirements of the technical explanations will vary with course level, the specific physical piece to be constructed, and the physical and/or chemical change(s) to be employed in the work. The project map includes a roundtable feedback discussion with peers and then a meeting with the teacher by which the teacher and student will formally agree upon which content information and explanations are necessary to support each unique piece.

The Materials
- Desmos software
- General art and chemistry supplies
- Other household objects, individualized materials for framing

The Showcase
A public gala display at the Bruce Museum of students’ paired digital and physical pieces, with QR codes linking to the detailed technical explanations of each as posted online. Other students, all parents, and any interested community members are be invited to attend.

Project Map
- Trip to the MoMA (or other museum) to see exhibition on cubism
- Create an initial image that represents your identity
- Revise image to incorporate features of cubism
- Begin Desmos representation of identity image
- Brainstorm possibilities for physical representation of identity
- Complete series of Manipulating Matter experiments for possible inspiration
  1. Cool Demos and Materials!!!
  2. Chemical Reaction in a Bag
  3. Flame Test!!!
  4. Single Replacement Reactions
  5. Double Replacement Reactions
  6. Properties of Chemical Bonds
- Complete Project Proposal for physical representation of identity image
- Peer critique on Desmos art
- Roundtable discussion/feedback on physical representation and technical explanation
- Approval of proposed physical representation and technical explanation requirements
- Additional meetings with teacher for instructional critique as needed
- Physical representation and draft technical explanation due
- Desmos art and draft explanation due
- Meetings with teachers for instructional critique and required revisions
- Physical representation and technical explanation due Friday January 15th
- Desmos art and original poster with explanation due Friday January 15th
Public Exhibition and Showcase - February 2nd at the Bruce Museum, 6:30-8:30 PM!!
MARK YOUR CALENDARS! TELL YOUR PARENTS/GUARDIANS!!
Appendix C2: Sample math assignment from STEM Self-Portrait Project (quarter 2)

GHS Innovation Lab
STEM Self-Portrait

Desmos Math Art Defense 2

Please complete all work in your ‘Desmos Math Art Defense Project Log - Last Name, First Name’

Choose three different types of equations in your Desmos art. At least two of them must intersect the x or y-axis if you remove the restrictions. The types of functions must be chosen based on your math class:

- Algebra/Geometry: all linear (one may be nonlinear if you choose)
- Algebra 2A/B: all non-linear
- Algebra 2H: all non-linear, one must be rational
- Precalculus: must be conics or trigonometric

For each equation you choose, find (if possible):

- your equation’s parent function
- your equation’s x-intercepts (show work)
- your equation’s y-intercepts (show work)
- where your equation increases
- where your equation decreases
- where your equation is positive
- where your equation is negative
- the domain and range of your equation
- any maximums or minimums of your equations
- the end behavior of your equations

You must have a clear screenshot with your function and one of the axes (so the reader can see scale).

Honors option - since you’re required to use a rational function, see the math resources document to learn about what they are. We will also do some group instruction in class. Then, in addition to the above requirements, find the equations of any horizontal or vertical asymptotes.
Appendix C3: Sample Environmental Chem Assignment from STEM Self-Portrait Project

STEM Self-Portrait
Identity Physical Piece

Requirements
1. Must be based on a unique piece of art inspired by an image representing your identity
   ○ in other words - must be related to your 2D Desmos image in some way
   ○ does NOT need to be an exact copy of your 2D Desmos image, just obviously related to it
2. Must display two or more visible colors (beyond black and white)
3. Must include two or more substances
4. Must be made using or perform at least one physical and/or chemical change
   ○ HONORS OPTION: Must be made using or perform a physical change AND a chemical change
5. Supported by written technical explanation, including descriptions/explanations of:
   ○ the chemical composition, properties, and manufacture of the major substance(s) in the work;
   ○ the physical and/or chemical change(s) incorporated in the piece; and
   ○ the predominant visual colors of the piece.
* Please note that the exact requirements of the technical explanations will vary with course level, the specific physical piece to be constructed, and the physical and/or chemical change(s) to be employed in the work.

Physical Piece Project Proposal:
To be completed no later than Friday December 4 (in other words - ASAP - sooner is better so we can help you find materials!!!!!)

REMEMBER - YOU ALSO NEED TO START MAKING THIS THING!!!! SO LET’S GET GOING…..

1. Overview: a general description of the piece you intend to create including:
   a. Description of what it will look like, the colors it will contain, and the substances of which it will be made
   b. Explanation of how it relates to your identity and how it relates to your 2D Desmos Image (please include a photo of your current Desmos image)
   c. Explanation of the chemical and/or physical changes you will employ in your work
2. Procedures and Safety Plan: a description of how you will make your piece including:
   a. Materials and Equipment: list everything you will need to make it
   b. Procedure: a description of how you will make it, including step-by-step procedures to create the physical and/or chemical changes employed
   c. Safety Plan: a description of necessary safety precautions you will take to make your piece
   d. For safety information on any substances you will use see the Flinn SDS Database
## Appendix D: Rubric for Innovation Lab blog posts

### Rubric for InLab Blog Posts

<table>
<thead>
<tr>
<th></th>
<th>Exceptional</th>
<th>Accomplished</th>
<th>Proficient</th>
<th>Developing</th>
<th>Revision Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td>Postings provide comprehensive insight, understanding, and reflective thought about the topic by ...building a focused argument around a specific issue, and/or ...asking a new related question, and/or ...making an oppositional statement supported by personal experience or related research.</td>
<td>Postings provide insight, understanding, and reflective thought about the topic through some of the listed aspects.</td>
<td>Postings provide moderate insight, understanding and reflective thought about the topic.</td>
<td>Postings provide minimal insight, understanding and reflective thought about the topic.</td>
<td>The work does not reveal the time, effort and thought to the degree expected. Work may be incomplete and/or directions may not have been followed completely.</td>
</tr>
<tr>
<td><strong>Style</strong></td>
<td>The entry is coherent, focused, detailed, and well-developed. Creative elements effectively enhance the writing. The structure of the entry effectively enhances the content. The writing is fluent, grammatically sound and virtually error-free.</td>
<td>The entry is generally focused, detailed, and well-developed. Creative elements enhance the writing. The structure of the entry effectively clarifies the content. The entry is proofread and virtually error-free. The language and syntax of the writing is fluent.</td>
<td>The entry is focused and has relevant details. Creative elements may not support or may distract from the other features. The entry is structured and clear. The writing is generally fluent, and mechanical and grammatical errors are minimal.</td>
<td>While the entry is on topic, it may lack insight or depth of a Proficient entry. The entry has some structure, but lacks consistent flow or cohesion. The entry is underdeveloped and has some errors in spelling and/or grammar.</td>
<td>The entry does not meet expected standards and/or does not develop the topic appropriately and/or does not reveal proofreading.</td>
</tr>
<tr>
<td><strong>Voice</strong></td>
<td>Postings are written in a style that is appealing and appropriate for the intended audience and a consistent voice is evident throughout. Postings are effectively professional and still reflect the author’s unique personality through expressive and carefully selected word choices that bring the topic to life.</td>
<td>Postings are written in a style that is consistently appropriate for the intended audience and a consistent voice is generally evident. Postings reflect author’s style and effectively maintain awareness of purpose and audience.</td>
<td>Postings are written in a style that is generally appropriate for the intended audience and an attempt is made to use a consistent voice. Postings reflect some of the author’s personality and generally maintain awareness of purpose and</td>
<td>Postings are written in a style that does not fully consider the audience, and the author’s voice is difficult to identify. Postings may be uneven in their attempts to balance the professional nature of public work and using a personal style effectively.</td>
<td>Postings do not reflect an awareness of the audience and it is difficult to identify the author’s voice. Postings do not reflect the balance between personal and professional.</td>
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<tr>
<td>Aesthetics</td>
<td>Audience</td>
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<td>Font, graphics, colors, multimedia and formatting enhance understanding and engage the intended audience.</td>
<td>Font, graphics, colors, multimedia and formatting encourage understanding and are appropriate for the intended audience.</td>
<td>A beginning use of appropriate fonts, graphics, colors, multimedia and formatting are present. Learning could be optimized with better use of multimedia.</td>
<td>Fonts, graphics, colors, multimedia and formatting create distractions from the content and reduce learning and readability</td>
<td>Visuals are missing or do not support the assignment.</td>
<td></td>
</tr>
</tbody>
</table>