

TO: Board of Education

FROM: High School Planning Team

RE: Learning Commons

DATE: May 7, 2014

Responses to Questions:

1. Please provide a detailed description of the entire scope of the proposed project.

The proposal is to create a Learning Commons, consisting of three distinct spaces:

- An I-Lab
- A maker/design space (D-Lab)
- A space for independent work, collaboration and informal dining

Over the last 20 years, a broad consensus has emerged about so-called “21st century” skills and knowledge graduates need in college and career. Many of these capacities are consistent with those Scarsdale has traditionally sought to foster through an emphasis on liberal learning and with our focus on thinking and complex problem solving.

For example, Stanford University’s Design School lists

- Critical thinking
- Creativity/Innovation
- Collaboration/Communication
- Integrated Problem-solving
- Resilience, Patience, Persistence
- Information literacy
- Self-motivation
- Desire to pursue a passion and make a difference

Related, there’s also been growing interest in improving students’ preparation in the STEAM subjects: science, technology, engineering, arts and math. “Improving,” most experts agree, is a two part process. One part is to expand opportunities, particularly in the last two years of high school. The other part is to re-design curriculum so that it more intentionally develops the 21st century capacities and more effectively assesses whether students are attaining them.

What should this curriculum re-design look like? An example: In schools, colleges and businesses today, there’s growing emphasis on what’s called Design Thinking, a structured process of understanding and defining a problem, developing ideas about how to solve the problem, prototyping those ideas or products, testing the results, and learning from the outcome. This is the genesis of i-Labs, Maker/Design spaces, and similar facilities at many universities including Harvard, MIT and Stanford, as well as in schools like Newton North High School in suburban Boston, and Horace Greeley, our sister to the north.

In other words, i-Labs and Maker/Design spaces are simply different versions of the same thing. Both are places for developing ideas and prototyping them, whether the product is an app that

will help people in Africa test water quality or a three dimensional model of a city block that's used for urban planning. These kinds of facilities are no longer experimental; they would be described instead as "leading edge."

Our proposal for a Learning Commons comprises both kinds of spaces, along with a third space that's been described as a less formal place for work than the library and a more serious place for dining than the cafeteria. The Maker/Design Space will be a place for developing, prototyping and testing things (robots, e.g.); the I-Lab will be a place for developing, prototyping and testing ideas (a computer app, e.g.). The third space (yet to be named) will be a place where students can work individually or in groups and also get something to eat. The atmosphere will be relaxed but purposeful. Rather than consisting of an open sea of tables and chairs, this space will be interposed with physical and visual cues and configurations of furniture that will support work groups of different sizes, as well as a reasonable noise level.

All these spaces are located in close proximity near a major intersection in the building and contiguous to the library, which will be connected to them. The Maker/Design space will be in the area now occupied by the old auto shop and physical education offices. The I-Lab will be in the area now occupied by the fitness center. The third area will be in what is now the northern half of Gym A/B.

The facilities in the Learning Commons will be new for Scarsdale. As with any new tool, they will create opportunities for uses that we cannot now imagine, but which it is our job to facilitate. We can be certain that a suite of innovation spaces will open the school culture to myriad possibilities. Fox Meadow's new MakerSpace (and 3-D printer) changed the school culture; the fifth-grade capstone project was innovative, useful, and inspiring. Technology has spurred the creation of clubs around the District, including Rube Goldberg Makers Clubs, Coding Clubs, and HackScarsdale. Middle schoolers have lately begun asking about social entrepreneurship.

The I-Lab

An I-Lab will provide large open space for one or two classes to meet for disciplinary or interdisciplinary work. It will also include separate but transparent space for smaller, independent groups to confer and meet with outside mentors, as well as quiet areas for global communications and teleconferencing.

The space will allow students to use laptops or tablets, and in a quieter area, one or more screens for teleconferencing and projection. Furnishings will include moveable white boards and chairs and desks on casters, with an emphasis on flexibility, so that the space can support both individual inquiry and group projects that incorporate design-thinking and collaboration.

For example, classes, student groups and/or individual students might:

- Use design thinking, which requires physical space to group and organize post-its as well as horizontal working surfaces to draw, map and create solutions.
- Work in collaborative groups to address course assignments and a wide range of other issues: non-standard interdisciplinary global concerns such as drought, hunger, disease, e.g.

- Consult via global networks as part of any number of different learning activities: take on challenge questions such as those posed by the Moody's Mega Math Challenge, e.g
- Develop apps to benefit the Scarsdale community: more efficient use of parking spaces; tech. support for senior citizens, sustainability on the high school campus, e.g.

The Maker/Design Space (D-Lab)

Maker Spaces at the elementary schools and the forthcoming Middle School Maker Space program have generated great interest among parents and students. Students who have been inspired by and engaged in these activities should have opportunities to pursue their interest at the High School.

The Maker/Design Space (D-Lab) will be a large open area that will accommodate up to two classes. The space will be transparent and connected to the pass through hall, and the hall will open onto an interior courtyard. Some smaller areas will be set off with transparent walls in order to provide security for equipment.

The Maker/Design space will give students access to CAD/CAM programs, a 3-D printer and laser-cutter and their attendant computers to facilitate design and prototyping; circuit boards, Arduinos and other electronic materials; as well as more traditional tools. Permanent fixtures will be complemented with open space that can be reconfigured and refitted as the needs of student learning and activities evolve.

Students will use the space during classes to complete class challenges. They will also pursue independent study and independent group design projects, including senior options, science research, and capstone projects.

First, any number of existing courses lead naturally to the use of math in applied settings: architecture, engineering and physics, as well as to extended or enhanced work in the humanities. While it's possible to pursue some projects in a traditional classroom, lab or even in hallways, a dedicated space will give students appropriate equipment and materials, less obstructed room to work and the capacity to leave setups in place for extended periods of time.

Some examples:

- Developing greenhouse models or solar ovens.
- Exploring principles of scaling, tension and compression by building model bridges
- Designing and building robots
- Working on Arduino projects*
- Designing and producing advanced architecture models
- Designing circuits through the use of electronic kits
- Developing green building materials and design
- Undertaking real-world projects in water, soil, food and plant science
- Creating and building solutions for water, building, transportation problems
- Creating symbolic objects to express complex ideas.

***An Arduino is an open-source electronics prototyping platform. It's intended for artists, designers, hobbyists and anyone interested in creating interactive objects or environments**

In addition, any number of existing activities will use the maker/design space. For example

- Science Olympiad projects
- Robotics club
- The Sustainable Garden Project
- Senior Options projects.

An example would be the work of a senior options group from three years ago that researched, designed, and built a model for a sustainable, "off-the-grid" house. They had no work room, no tools, and no place to store their supplies or work in progress. They ended up going to the shop in the middle school to use woodworking tools.

Second, the school intends to build out a more developed STEAM course sequence or curriculum "thread" that involves students intentionally with the design process and the invention and production of objects such as three dimensional models. Engineering will be a focus, with an emphasis on interdisciplinary collaboration among math, science and technology. Students have requested this kind of coursework for the last few years.

The offerings would likely appear as electives in grades 11-12. These would introduce students to practical applications of disciplinary knowledge. For example, a D-Lab-based course could expose students to different kinds of engineering efforts, blending the mathematical treatment of physics with hands-on, problem-based design challenges, employing technology in the process. Students would work in small design teams to develop solutions to engineering challenges, build virtual and material prototypes, evaluate and/or redesign them.

The space would also make it possible to offer lab-based interdisciplinary classes such as architecture and environmental science, public policy and biology.

Third, the Center for Innovation intends to invite faculty proposals for program innovation along lines discussed by leading edge thinkers like Yong Zhao, Tony Wagner and Will Richardson, each of whom has visited Scarsdale in the last two years and who have also made presentations to the community. Themes from those presentations have included the importance of:

- Developing critical thinking, collaboration, communication, creativity, grit.
- Focusing on competence in these capacities (as distinct from spending time in class)
- Using technology to acquire content knowledge/basic skills where appropriate
- Teacher's role as guide, mentor, tutor (as distinct from "sage on the stage.")
- Learning through project work and application of knowledge
- Demonstrating competence to an "authentic" audience, with support from evidence

The Center for Innovation will sponsor teacher teams interested in developing curriculum, instruction and assessments that focus on these capacities.

The Work/Dining Space

This area would have a mezzanine that would provide access to the third floor and would increase the usable space. The removal of barriers between the learning commons and the

hallway would create a visual appeal that would draw students to the space. The former locker room on the north side of the learning commons would serve as a kitchen; the former locker room on the south side would be converted to offices for athletics and physical education. The bathrooms, many of which are not functional, would be renovated and would serve as student bathrooms.

We do not want our students to be left behind, especially when we have the opportunity to bring SHS into the 21st century. Indeed, teachers are ready to revise their teaching to reflect these challenges. In a survey in March 2014, 84% of teachers surveyed said that a moderate, large, or very large percentage of our students would benefit from having such spaces in the school.

2. Why is the project needed in your building? Please include logistical, enrollment, infrastructure, curricular, security, and other current concerns that it will address.

This project addresses both practical needs and our educational aspirations.

We have reached or exceeded capacity in the main cafeteria and library. The student population has increased 25% over the last 12 years, and these spaces no longer serve all our students adequately. A hybrid space will alleviate the pressure on the cafeteria and library to serve students as it will contain features of each of those spaces.

Increasingly, our students are asked to work together in and outside of class in instructional groups that vary in composition, size, and purpose. Moreover, many of our classes are now linked or teamed, so that two teachers teach the same 50 or more students in two sections. Teachers should be able to convene all 50+ students in one room—for rehearsals, group project work, performances, lectures, and assessments.

Further, we currently lack flexible space where students can go voluntarily to do individual or group research or collaboration. Likewise there is little or no space where whole classes or parts of classes can do this kind of work. As a result, students sit on the floor in the hallways and the library *de facto* becomes a crowded combination space where some students are trying to study or do quiet research while others are working together. The library, which is larger than the one it replaced in the early 2000's, has been fully subscribed or over-subscribed almost from the start.

More fundamentally, no space in the building is designed to facilitate the kinds of thinking, interacting, or prototyping that a 21st century curriculum requires. Most of the high school's classrooms are below modern square footage standards and were built at a time when desks were either fixed to the floor or packed tightly in rows.

Currently, even an oversized classroom assumes students will work in a passive mode, with the teacher at the front. As soon as they are asked to get up and move around, work in groups, make or build something, brainstorm or prototype, experiment or demonstrate, the size (and configuration) of the space is inappropriate.

In contrast, during our recent visit to Horace Greeley, the superintendent specifically noted that the flexible arrangement of their I-Lab led naturally to less traditional class configurations. With

adequate space, walls coated to accept magic marker writing, and flexible furniture, she said, the focus of attention has migrated from teacher at the front of the class to groups of people exchanging ideas and collaborating within the room.

Some examples of the kinds of work that current space discourages: group projects in History; wave, measurement, and force lessons in Physics; collaborative problem-solving in all subjects. Any project that requires students to make something either ends up in the hallway, on the floor, or results in such interrupted work-time and space that little progress is made and much time is wasted. As a result, teachers plan less of this kind of work and many students simply choose to do the “creative” aspects of their projects at home.

Equipment and materials are also insufficient for what we are trying to do. Any project resulting in artwork ends up on someone’s living room floor or dining room table. Students who are making and innovating are doing it at home on their own, often without the support and direction the school could offer.

Examples of things that cannot be done as well as we could or not much at all : environmental science and ecological design, engineering and math applications, real-world problem solving, global communication and understanding.

3. What are the implications of the project for emerging instructional methods and 21st century learning? Please describe some specific instructional plans for the space.

21st century learning involves the development of essential capacities such as complex collaborative problem-solving, global awareness, and human-centered innovation. The proposed facilities will encourage group interaction, facilitate collaboration, and foster the innovative energy that comes from seeing what other people are working on and inspired by. Design thinking develops the habits of mind found in innovators. The design process requires considerable group listening, idea formation and definition. It also depends on facilities and equipment for prototyping and testing ideas and materials.

Finally, engineering and other STEAM courses involve design and production. One would never expect an athlete to study his sport and not play it on the field, nor would one expect an actor to read plays in a book and not produce them on stage. It’s equally unsuitable for an engineer, scientist, technologist, or artist to study her or his subject and not produce anything concrete in the process.

4. Please describe the features of the space that will provide flexibility as new instructional methods are introduced.

A main idea in the Learning Commons is to keep permanent fixtures to a minimum and to instead focus on furniture and furnishings that can be moved and reconfigured easily. These spaces will help get students out of environments where they are receivers of content and encourage active engagement in the learning process through complex, real-world problem solving.

For example, in the I-Lab, white boards on wheels will create smaller spaces. Flexible furniture will be configured in different ways to facilitate interactions among students and teachers.

Power outlets will allow students to charge laptops anywhere in the room. Audio-visual equipment, such as a projector and screen, will allow students to make presentations in different parts of the room.

5. Does the project provide new opportunities for collaborative and interdisciplinary instruction? Please describe.

Yes. See above.

6. How does the project contribute to the sense of community and connectedness in the building?

The Commons will create a gravitational center to the building and will allow students to have a place to congregate during the day to work, eat, and interact. Classes and students will use the spaces throughout the day. Because of increased visibility and accessibility from two floors, they will serve as a showcase of learning and a focal point for the school. The new spaces will facilitate a cultural shift towards more collaborative and innovative teaching and learning.

7. Does the project scope address specialized instructional programs such as the arts, physical education, special education services, etc. Please describe the specific instructional uses for the new space.

The space could be used to enhance the program of instruction in the arts, giving students equipment and space to create work they cannot produce in existing facilities. Our current curriculum is particularly heavy in the visual arts and ceramics, and we also have offerings in architecture, computer-generated graphics and photography, and sculpture.

Few Scarsdale High School students currently have exposure to art-as-craft, experiences that feature spatial problem-solving, fine-motor manipulation of tools, the attention to detail required by making something that works, and the joy of working on a thing (reiteration) until it is fully realized (i.e., replacing fear of failure with a sense of progress and adventure) in the school setting. The D-Lab would facilitate this kind of experience.

At least as important, however, is the potential to expand the arts program in the area of industrial design. Industrial design is the use of applied art and applied science to improve the aesthetics, ergonomics, functionality and or/usability of a product. It takes design principles and applies them to real-world problems. For example, the I-phone is a highly successful creation. It had to be designed with multiple criteria in mind to meet certain performance standards.

Finally, teachers have indicated that the new space would be incredibly helpful for special education students who often learn quite successfully through hands-on experiences. "I am thrilled to teach a new course in physics next year," says one, "that will be for students who face academic challenges due to learning disabilities. The maker/design space would give these students an opportunity to work with hands-on activities that will be based on lessons designed for the STEM curriculum. We will approach the year with a project-based inquiry approach to learning conceptual physics. We will concentrate on the engineering design process."

8. Does the project incorporate the use of technology as an integrated feature of the space?

Yes. Computers will be laptops or netbooks, and students will make use of the wi-fi already in the school. The spaces will have projectors that could be connected to computers, as well as peripheral devices as necessary (printers, etc.). Other equipment will include a 3-D printer and computers with CAD/CAM capability.

9. Will the project reflect environmental and sustainability improvements? Connections to the outdoors?

By re-integrating and improving visual access (glass walls or windows) and by improving physical access to corridors, classrooms, courtyards (“streets,” buildings,” “piazzas”), we will:

- make learning transparent to view
- invite students and teachers to connect, converse and collaborate
- reclaim outdoor “classrooms” and congregation spaces
- bring light and life into the building

The facility will be constructed with sustainability standards in mind. Some operating economies may be achievable as a result.

10. If the project doesn't get the green light, how will the problems identified above be resolved?

Students and teachers will continue to improvise as best they can in the spaces we have. We could use annual facilities funds to convert individual classrooms to mini-l-Labs, but space and budget limitations would eliminate the potential for use by more than one section of students or students on their own during the day.

Students will not have the opportunity to pursue a number of educationally valuable activities in school. Our curriculum will not be aligned to what colleges are doing, and students might not leave us as well prepared for college and careers. As our peer schools in the region and the country move ahead in bringing these spaces online, we will be left with a building suited for high-school education in the 20th century.