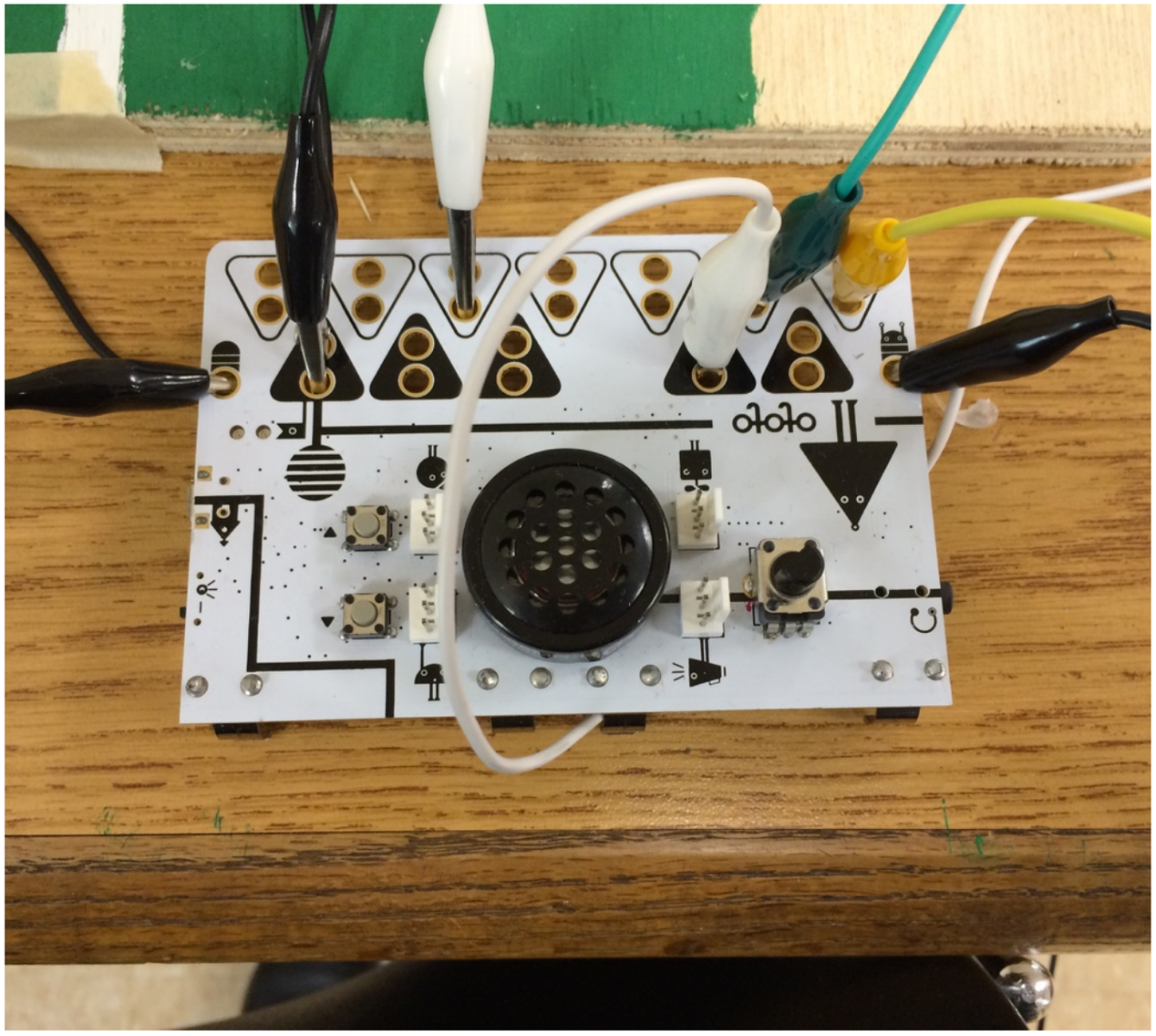
The Scarsdale Center for Innovation



CHAPTER 1

Introduction

Center for Innovation Mission Statement

The Center for Innovation was founded to support The Scarsdale Education for Tomorrow. In order to be better prepared for the future, Scarsdale graduates must:

- think critically and creatively in order to solve complex, non-standard problems
- understand their role in an interdependent world
- use evolving technologies for research, communication, and innovation

The Center for Innovation (CFI) is focused on re-imagining education for all students. It is empowered to develop, nurture, and provide feedback for innovative ideas relating to teaching and learning. The Center will link educators throughout the community so they can develop, test and implement, and evaluate innovative ideas and methodologies in order to imagine a future that has yet to be invented.

By focusing on large-scale educational change and partnering with members of our community, CFI intends to demonstrate how public education can be transformed, helping to prepare all students for the world of tomorrow.

In the fall of 2011, Scarsdale superintendent Dr. Michael McGill challenged the faculty to think about the future of public education. He called for the establishment of a formal organization, the Scarsdale Center for Innovation, to help the school community "rethink" how teaching and learning would change during the next decade. In the fall of 2012, the Scarsdale Center for Innovation was formally established with funding provided by the Scarsdale Board of Education. Lynne Shain, Assistant Superintendent of Instruction, and Jerry Crisci, Director of Technology, were asked to lead and manage the Center.

Fostering innovation in K-12 education has many challenges. Schools operate in a highly regulated environment, teachers are typically risk-averse, and education has a tradition of slow, organic change. The Center would have to address these issues in order to carry out its mission.

The Scarsdale Center for Innovation is unique in that it is based in a K-12 public school district, not hosted by a university or a corporation. This is a new model of innovation, and the Center had to decide how it should be structured without the benefit of looking at work in other districts. The focus of the Center is on "big ideas" and large scale transformation, allowing teachers to question the status quo and re-imagine teaching and learning. An important function of the Center is to support projects that would explore or demonstrate innovative educational practice.

INTERACTIVE 1.1 A list of projects supported by the Scarsdale Center for Innovation

Planning the Center

A group of teachers and administrators began to think about the structure of the Center. They quickly realized that they needed to plan site visits to observe how educational institutions create opportunities for innovation. Because they

could not find examples of K-12 innovation labs, they decided to visit centers that were hosted by universities. They contacted representatives from the Harvard iLab, the newest university innovation lab, as well as a professor at the MIT Media Lab, the oldest lab dedicated to innovation. These visits helped the Scarsdale planning team understand the key design principles of an organization that promotes innovation.

GALLERY 1.1 Site Visits

A Scarsdale planning team tours the Harvard iLab

After returning from their initial site visits, the team agreed to host a series of focus groups to help define the Center. Planning for the Center required input from all stakeholders. Over 90 teachers attended the Center's "kickoff" meeting. Community members and high school seniors were asked to provide ideas that would inform the work of the Center.

After listening to ideas from District stakeholders, it was determined that the Center should sponsor a number of activities to promote understanding about how schools could engage in innovative thinking. These included research, program development, and site visits to organizations that were designed to foster innovation. In addition to visits to the Harvard iLab and the MIT Media Lab, members of the planning team visited the "Edgeless School" exhibit at the American Institute of Architecture in New York City. Some team members visited the Avenues School in New York, a private, technology enriched school in Manhattan. Team members also had conversations with representatives from Google, university faculty members, representatives from IDEO, a technology design firm, and other educational consultants.

A Steering Committee was formed to draft the Center for Innovation mission statement and project proposal

applications. The committee created criteria for the proposals, specifying that all grants had to be:

- Aligned with the District's strategic plan - The Scarsdale Education for Tomorrow
- Focused on institutional redesign
- Large scale (i.e. a structural change in delivery of curriculum, instruction, assessment, support services, physical plant)
- Based on an original idea, or build on an existing initiative by taking it to a larger scale

Scarsdale teachers submitted innovation project proposals, and eight projects were selected to receive funding and support.

This eJournal chronicles the first year of the Center's operation and describes each of the funded projects. This document contains many interactive elements - photos can be enlarged by "pinching and zooming," photo galleries allow the reader to look at image collections, and video excerpts from consultant's speeches and teacher interviews will help you to understand some of the key ideas we discussed during our first year of operation. The Scarsdale team hopes that this eJournal inspires other school districts to create their own innovation centers, and ultimately allows groups of schools to form innovation networks.

GALLERY 1.2 Planning the Center

Scarsdale teachers work on the Center for Innovation mission statement.

The Center for Innovation Steering Committee would like to thank the teacher project teams that submitted reports for this eJournal. The committee would also like to thank Doug Rose, Middle School Computer Teacher, for reviewing the narratives from each group and helping to organize this document.

CHAPTER 2

Speakers

The Center for Innovation sponsored several speakers during its first year. Nationally recognized experts on innovation and the future of education came to Scarsdale to share their wisdom with teachers, Board members, and members of the community.

Tony Wagner

Tony Wagner is the first Innovation Education Fellow at the Technology & Entrepreneurship Center at Harvard. He was the founder and co-director of the Change Leadership Group at the Harvard Graduate School of Education. His most recent book, *Creating Innovators: The Making of Young People Who Will Change The World,* provides a roadmap for parents who want to help their children prepare for the workplace of the future.

On December 15, 2012, Dr. Tony Wagner visited the District. His visit was a follow up to an earlier phone conversation and a visit in the summer.

Wagner spoke to the faculty about his observations concerning the Center for Innovation, saying that the Center's grant proposals represented some of the "most exciting work in American education." Wagner said that he would try to explain why the Center's work is so critical for this country and for the future of our students.

According to Wagner, "The real problem is not that our schools are failing and in need of some modest reforms; the problem is that our American system of education is obsolete and needs re-inventing and not reforming"

Wagner stated that "We have an innovation-driven economy" and schools needed to be re-invented because they were facing two fundamental challenges:

- Increasingly, knowledge has become a free commodity. What is the purpose of school if you no longer need a physical teacher in a physical classroom?
- The nature of work is changing at a stunningly rapid rate. Routine work is disappearing. How do we prepare kids for a very different world where it is unlikely that they will have a lifetime career?

AUDIO 2.1 Tony Wagner explains how the "culture of schooling" is radically at odds with the "culture of learning. "

Wagner described the shift happening in our workplace: "Fundamentally…The world simply no longer cares how much our students know. What the world cares about is what they can do with what they know which is a completely different education problem."

Wagner described his "Seven Survival Skills," core competencies that every student must master. They are:

1. Critical thinking and problem-solving

2. Collaboration across networks and leading by influence

3. Agility and adaptability

4. Initiative and entrepreneurism

5. Effective oral and written communication

6. Accessing and analyzing information

7. Curiosity and imagination

Wagner made reference to the economic collapse and said that innovation was necessary to create jobs. He said that "The idea of an innovator is a creative problem-solver, not just someone who studies a lot of math and science." He asked "What must we do differently, as parents, as teachers, as mentors, and as employers to develop the capabilities of every young person to be a creative problem-solver?"

Wagner stated that "The culture of schooling…is radically at odds with the culture of learning that creates young innovators" and provided examples to support his claim.

He concluded his talk by highlighting the importance of "play, passion, and purpose" and their role in creating innovators.

INTERACTIVE 2.1 Tony Wagner speaks to members of the Scarsdale administration and Center for Innovation project teams.

Yong Zhao

Yong Zhao is the Presidential Chair of Global Education and Online Learning at the University of Oregon, where he also serves as the Associate Dean for Global Education and Online Learning, and the former Director of the Center for Advanced Technology in Education (CATE). He is also a full professor in the Department of Educational Measurement, Policy, and Leadership (EMPL).

AUDIO 2.2 Yong Zhao discusses the importance of teaching creativity.

Dr. Zhao talked to teachers and the community about how the American educational system suppresses creativity. He discussed the importance of helping students to develop an entrepreneurial mindset.

Zhao discussed "a new paradigm" of education, where we can make sure that "everyone is great in their own way and everyone's difference is celebrated." He proposed that "the curriculum should follow the child...the curriculum should revolve around children's interest." He said that education should be used to "enhance a strength" rather than fix a deficit.

Zhao also talked about the importance of allowing children to work with global partners. He told Scarsdale teachers that students should engage in discussions about global problems, and they should understand that they are global citizens.

Will Richardson

Will Richardson has presented to tens of thousands of educators around the world about the compelling intersection of social online learning networks and teaching and learning. His ideas on personal and systemic change around learning have been published in dozens of journals

AUDIO 2.3 Will Richardson discusses the "huge transition" that is challenging all educators.

and magazines. He has authored several popular books include *Blogs, Wikis, Podcasts, Personal Learning Networks* (with Rob Mancabelli) and *Why School*.

Richardson spoke to teachers about the dramatic technological changes that are impacting the lives of young people. He challenged teachers to change their practices in order to make learning relevant for their students.

Richardson told teachers that education is undergoing "a really big shift." He said, "If you're not feeling uncomfortable about education right now, you're not paying attention...there are things happening that are really profound."

He told Scarsdale teachers that "You are at the top end of every measure of successful schools...you are succeeding at a very high level though this traditional sense of what we think learning and schooling should look like." He challenged teachers to think about the difference between

GALLERY 2.1 Center for Innovation Speakers

Will Richardson talks to Scarsdale High School teachers.

traditional education that is “delivered” vs. modern learning that is “discovered.”

Richardson said that “this is probably the most disruptive moment there has ever been in education, but I can’t imagine a more amazing time to be a learner.” He discussed the NCTE literacies as a model for understanding how teaching and learning has to change.

Richardson outlined the main challenge facing educators today - they have to teach in a traditional way while using technology to allow students to experience “modern” learning.” He told teachers “ You have to do both.”

Other Speakers

Gabriel Rossi

Gabriel Rossi is the Associate Director of Faculty Affairs at the Yale School of Management. Mr. Rossi spoke to teachers about his work in helping to foster innovation in higher education.

Paul Hendersen

Paul Hendersen is a Scarsdale alumnus who is interested in developing new technology tools to support education. Mr. Henderson spoke to teachers about the future of content delivery and shared a prototype app that he is developing for K-12 students and teachers.

CHAPTER 3

Designing an Elementary Makerspace

There is a relatively new and growing movement to reinvent American ingenuity and manufacturing on a small, personal scale. The “Maker movement” encourages all that is best in education: experiential learning, communication, creativity, collaboration and true critical thinking.

In the great age of American manufacturing, households across the nation had basements and garages where parents and children created, tinkered and had opportunities to work with tools and materials. Children learned by trying, failing and reconfiguring. This homegrown manufacturing has been on the decline in our media rich, service oriented society. The typical child from the Lower Hudson Valley has little opportunity to tinker in a garage or basement workshop. Their parents don't, and they don't.

This proposal funded the development of a prototype Media Lab/Makerspace for elementary students that will promote STEM and give learners the opportunity to engage in real engineering and design work. The lab will promote critical and creative thinking by giving students an opportunity to plan, design and create with a variety of digital and standard tools.

As Tony Wagner suggested, we should view our project in light of a problem we are trying to solve. We propose that by creating this center, encouraging challenge-based learning, students will become better problem solvers and risk takers in terms of learning. They need time to build prototypes, to fail, and to reconfigure. They need more time to get their hands on tools, art materials and electronics. Students need to build models. We want them to be able to share these skills with peers. Children need to take things apart so they

GALLERY 3.1 The Evolution of the MakerSpace

Construction on the MakerSpace began in the winter of 2013 with the installation of new tile flooring designed to help students measure distance of traveling objects.

better understand their workings. We are looking to enhance dispositions that are often hard to measure in a standardized way, but are critical to the education of a complete person.

Our team has transformed a once cluttered and dark storage room into a bright, inviting space where teachers will incorporate STEAM (Science, Technology, Engineering, Arts and Mathematics) to a greater degree than has been

MOVIE 3.1 Duncan Wilson

Duncan Wilson, Fox Meadow principal, explains the potential impact of his school's Makerspace on student learning.

possible into the elementary school day and outside of that day. We are calling the space the Fox Meadow Maker Space. The Makerspace is both a physical space and an ethos; failure is ok, collaboration is vital, we learn by doing.

Our team visited the Makerspace in the Westport Library and came away inspired and hungry to begin working on our space. Their center proved that a small but dedicated space could serve a large community. We were impressed by the scope of some of their woodworking projects and their use of a 3D printer. The directors were very helpful in giving us pointers for starting. They have a strong vision, as we do, of what they want the space to look like and how they want it to grow over time.

The team has a long list of tasks accomplished thus far in building the Makerspace. In terms of the actual space, we have cleared a cluttered storage room and had the floor tiled as well as adding electrical outlets. We ordered cabinets to that were installed this summer. The bank of white laminate cabinets were installed over a long workbench that runs the length of the room, almost 20 feet. The space flows into both the computer lab and library and many activities can circulate between the rooms.

In order to introduce the space to various groups we have provided kickoff meetings with hands on experiences. We introduced the space and concept to the staff and suggested opportunities for their participation. Some of the staff have already expressed interest in trying a project. A second grade teacher builds a model city out of boxes and students wanted to incorporate stoplights into the streets. The Makerspace can effectively be brought into this classroom by using the littleBits kits. This type of push in will be ongoing. Science and math helping teachers can work with us as well on building activities and challenges.

The parent kickoff took place in the early spring at the annual multicultural luncheon. The space was presented both

in terms of theory and practice through a keynote presentation. First, parents were treated to a 3D "tour" of the space created in Sketchup. We highlighted democratic problem solving, critical thinking, collaboration and creativity. We spoke of the alignment with the core elements of the Scarsdale Education for tomorrow with a coordinated focus on critical and original thinking; efforts to develop our students' capacity to apply knowledge to problems with no clear answers.

MOVIE 3.2 Peter McKenna

Fox Meadow computer teacher, Peter McKenna, describes the activities available for students who visit his school's prototype Makerspace.

The marshmallow challenge was presented at the second half of the meeting. Tables were given one large marshmallow, a yard of tape and some spaghetti. The challenge was to make the tallest tower in eighteen minutes with the marshmallow on the top. This activity is representative of one we might do in the Makerspace, using challenge-based learning, cooperative teams and a science/engineering challenge. It was fascinating to watch the individual approaches of the parent/teacher teams. Some teams planned their design on paper, some formed small sub-teams to build iterations of a tower, and some began creating right away, with a focus on building a complete tower. Winning the challenge became a secondary concern as each team focused on their collaborative efforts.

We have purchased some interesting materials so far. littleBits are simple blocks which make circuits. Third graders have explored them and have been challenged to create a useful device such as a box that lights up when opened. Makey Makey is a small Arduino computer that allows anything conductive to become a switch or button in a game. For instance bananas become a joystick to navigate a computer maze. Several types of Lego robotics kits are now in use in the space and in after school clubs. Clubs have purchased materials like a full set of Mindstorms robotics. The PTA club chairs have been and will continue to be a major supporter of the space in terms of materials and idea

GALLERY 3.2 The Fox Meadow Prototype Makerspace

Creating a sign for the new Makerspace

refinement. The 3d printer is used daily by students for prototyping and printing 3d objects they have created in Sketchup. As interest grows, students are making time at lunch to come learn the basics of 3d design and then sharing the knowledge with others. By allowing student to explore these engaging tools and to teach each other, they form personal learning networks based on interest and ability.

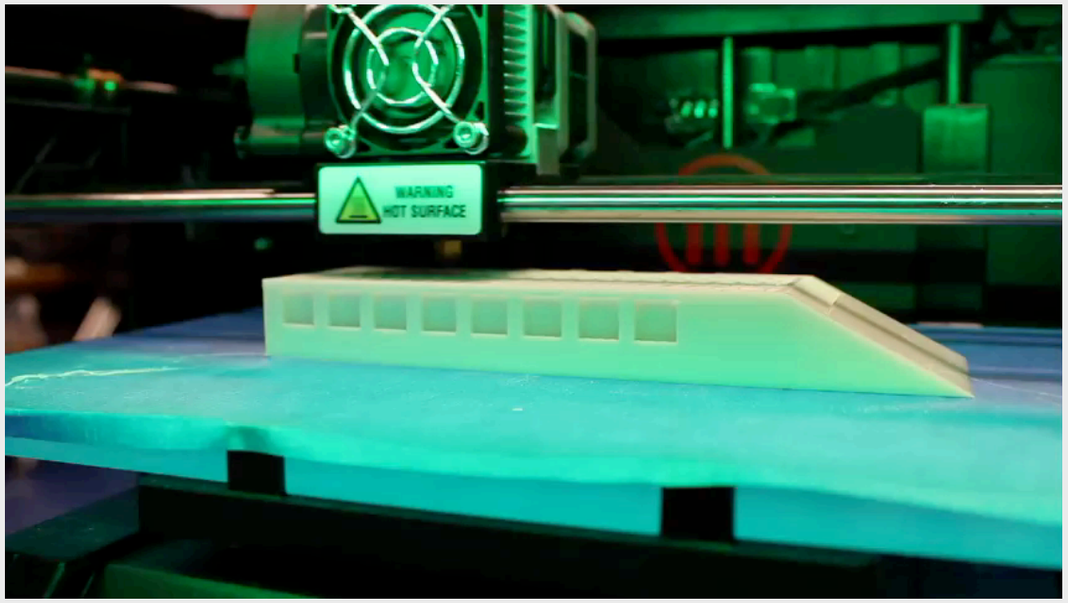
The student impact even now is obvious. Students are engaged and excited to program in Scratch, design in Sketchup and build and program robots. Students are creating a Makerspace sign. They are cutting the wood, choosing decorative materials and planning the layout. We see natural interest groups developing; programmers, designers, troubleshooters, researchers and instructors. We hope to extend this interest next year by taking on a specific with new projects.

As teachers and parents become more involved with the space we hope that they themselves will engage in modeling resourcefulness and ingenuity. We hope they are risk takers in the same way we ask students to be. This might be our biggest challenge aside from scheduling: allowing and even encouraging failure for the good of process.

We plan to open the space during lunch (it is now to some degree) and we will need both staff and parents to help. The PTA has expressed interest in this and we will need to formalize schedules in the fall. In the morning we envision a "Mom and me" or "Dad and me" workshop type class that occurs on a regular basis at 8AM, both with structured and unstructured activities. We have heard from many interested individuals who have offered to participate.

Finally, we plan to create connections to other nearby Makerspaces and STEAM centers (there are not many, but

MOVIE 3.3 Makerbot 3D Printer



A fifth grade student designed a maglev train model using SketchUp software and printed it on a 3D printer.

interest is growing) and build our own learning networks to facilitate the sharing of ideas. Librarians from a nearby school are visiting on May 17 to see how they might proceed with their space. Conferences have provided connections to other interested schools as well.

After meeting with the creators of other maker spaces, we realized that assessment has not been a clear goal for these other projects. Since it is our goal to use the Maker Space as a place to better understand how elementary school children approach and solve problems we feel it is important to name the dispositions, skills, and expertise that we are striving toward.

In terms of "expertise," we did see some examples at the Westport Maker Space where students are recognized for gaining particular technical skills. For example, a student can be trained to run the 3D Printer. This recognition gives that student certain privileges and sometimes certain responsibilities. A trained student might be asked to mentor a new user or to volunteer time running the printer for others. We would like to develop a "badge" or certificate system where kids are recognized for learning skills (soldering, wood work, writing code etc). To this end, some of our projects may be more prescriptive but have embedded in them the skill that a student might need before tackling a larger project. So, one way to assess our progress will be to keep track of how many students are learning certain skills.

In terms of "skills and dispositions" we are chasing something that is harder to name. Tony Wagner has defined certain disposition of innovators. Other have described certain habits on dispositions of critical thinking or of creativity. For now, we want to play with four:

1. **Risk Taking and Resilience:** How well does a child learn through experimentation and failure? How willing is a child to try something even when it might be wrong? How long will a child stick with a problem? How well can

children describe problems with knowledge statements and not belief statements (eg a knowledge statement is: "It is 100 degrees outside." A belief statement is: "It's too hot to play outside." Or knowledge: "I know that this piece is not strong enough to.." vs Belief: "This will never work..")?

2. Visualization: How well can a child "see" the problem or represent it or describe it in different ways? This disposition also incorporates the ability to make a plan or follow a set of plans.

3. Applying knowledge to new situations: How well can a child use their knowledge of a material or a concept toward solving a problem? (I know wood floats, so maybe I can use wood to...) Within this disposition is the ability to re-purpose an item. ("Ten uses for Duct Tape" is a great exercise in re-purposing).

4. Collaboration: How well can a child work with others to share, borrow, adopt, and adapt ideas? This disposition requires the ability to listen and to communicate- the ability to hold fast to one idea and be willing to let another one go. We see the opposite of this disposition when child says: "He said what I was going to say!" or "He took my idea." Instead of, "I was thinking about this in the same way. or "If we take your idea and combine it with... then we can..."

This list of four dispositions is not exhaustive nor will it remain static. But by starting with four, we feel that we have named the skills and dispositions that we can assess and model for the children. One way we hope to assess these skills over time is through asking children (live or through video) to explain their thinking as they work through problems. We also want to create opportunities for children to showcase their work.

How do students benefit from this project?

- Students build the skills and dispositions referred to above.
- Students become teachers and are responsible to train others.
- Students return in upper grades to train younger students (ie. High school internship)
- Students have access to tools and time to tinker with real world STEM problems.
- Students have more access to interest based learning.
- Students build social and collaborative skills.
- Students build creativity and problem solving ability.

Project Team

Dan Brodsky (Third Grade), Sara Faranda (Art), Alethea Lynch (Third Grade), Peter McKenna (Technology), David Scholl (Learning Resource Center), Jan Schorr (Librarian) Duncan Wilson (Principal)

Chapter 4

Developing the Scarsdale Teachers Collaborative and Collaborative-Inquiry/ Innovation Classrooms

One of the most promising solutions for promoting instructional reform and innovation must be on developing the capacity of teachers to better address the issues and problems that students will face in an ever-changing world

Developments with technology, changing economies, and sociocultural shifts within the past fifteen years have provoked serious questions about school reform and current practice in education (Wagner, 2010; Friedman, 2007; Zhao, 2009):

- Are we truly preparing our students for an increasingly interdependent and interconnected world?
- What content, skills, strategies, and dispositions will our students need to successfully adapt, achieve, and contribute to a diverse and changing global community?

While we look to broaden student experiences with a Scarsdale Education for Tomorrow, our national discourse seems to be driving us in the opposite direction. The current reform movement encourages schools to conform to a "standardized curriculum" through the reward system of performing well on high-stakes testing within a few subjects rather than providing authentic opportunities for students to develop talents, skills, strategies, and dispositions needed to succeed across a broad range of subjects. Decisions of curriculum and teaching are placed in the hands of non-educators such as textbook publishing companies, state departments, and politicians rather than relying on the expertise and knowledge of educators who actually do the research and teaching within classrooms.

These influences have affected teachers at the elementary level as they are finding fewer opportunities to take risks and fewer chances to implement creative ideas for engaging students and providing them with a world-class education. As current discourse in education moves toward greater accountability through rigid systems of metrics and testing, teachers are conditioned to teach with a narrow focus. When professional learning and sharing is controlled through a rigid hierarchy, collaboration networks that could flourish and innovate move "underground" or are considered "outliers" (Wagner, 2012). Nonetheless, studies have proven, 'domesticated' Communities of Practice that have been empowered by the parent organization to effect change, prosper with a shared purpose (Chanal, Kimble, 2010).

More opportunity is needed to support teachers to innovate and work collaboratively in order to improve instructional practices. One of the most promising solutions for promoting instructional reform and innovation must be on developing the capacity of teachers to better address the issues and problems that students will face in an ever-changing world (Allington & Cunningham, 2007). Evidence exists that professional learning communities and collaborative learning systems for teachers can have a strong impact on positive outcomes for schools and student learning (Martin-Kniep, 2006). By cultivating talent from within our district as well as integrating theories and

perspectives from outside of our district, we can begin to build capacity at the elementary level where new ideas can be sought after, articulated, and disseminated for the benefit of students (Darling-Hammond, 2003).

The purpose of our grant is to deliberately inspire creativity and innovation through research and development at the elementary level by creating The Scarsdale Teacher Collaborative and the development of Collaborative Innovative Classrooms.

Group Progress

Phase 1: Establishing the Culture of Innovation

Our group began by examining current research on establishing a culture of innovation through theories in social cognition, collaboration, social capital/social network development, and professional development. Through this examination, we've developed the concept of the Scarsdale Teachers Collaborative (ST@C)--a community of educators that supports and shares inquiry-based innovative practice, engages in collaborative dialogue, and seeks to provide students with a modern education.

The intent of the ST@C is to provide fuel for our teachers' personal learning networks, bringing together people with common interests and pursuits. It will connect teachers with district colleagues as well as educators and experts from around the world. The ST@C explores questions, problems, or themes associated with current innovative educational theories and practices such as creativity and critical thinking, digital literacies in 1:1 technology classrooms, or expeditionary learning in order to gain more information for understanding how to effectively implement these new educational innovations. Through open systems of online and offline networks, educators can support and contribute to research and development of ideas regardless of geographic location or position. Members of the ST@C actively seek to collaborate with each other and with experts outside of the district who become valuable resources to support inquiries or help design proposed innovations.

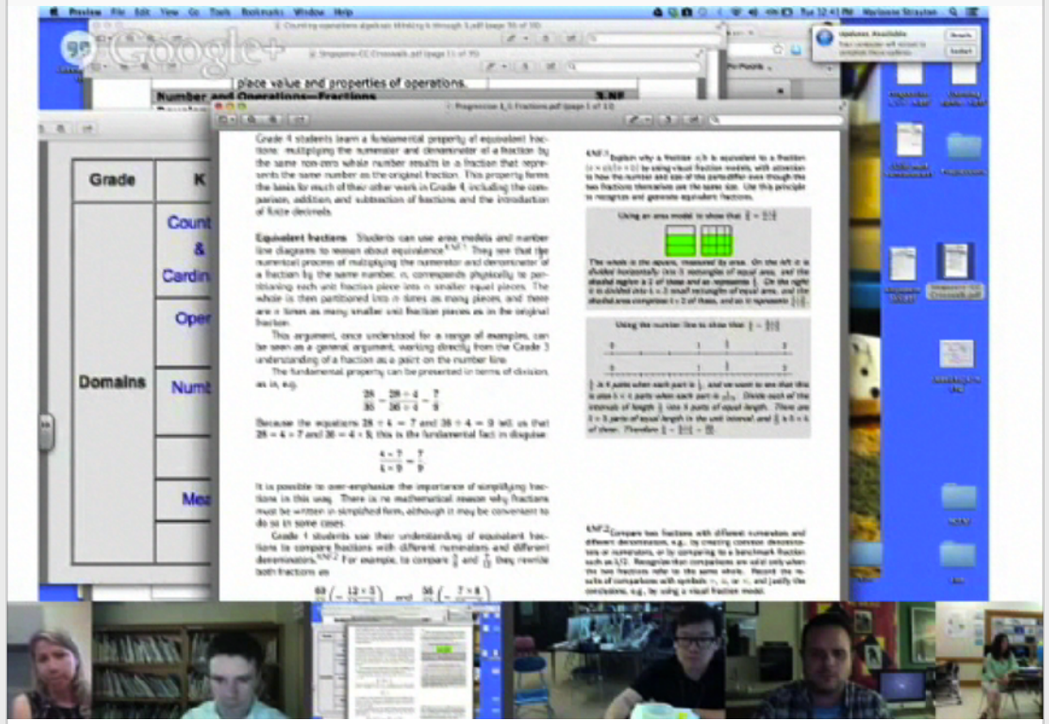
Support is provided to any teacher who is interested in further articulating the skills, strategies, and dispositions for new learning through four avenues:

1. Online opportunities

New technologies afford the possibility of personalized learning, collaboration, and connecting to resources beyond our classroom, school, or district. The ST@C aims to promote these ideas through online venues. The main hub of the ST@C will be the ST@C website (www.scarsdaleschools.org/stac) which will be a space to inform and update educators of ST@C events and provide links to areas where ST@C members can collaborate and

share files or resources. One of those areas for online collaboration will be through communities and "Circles" or social groups of educators on Google+, a social media platform integrated through our district's Google service.

INTERACTIVE 4.1 The ST@C team hosts a videoconference "Hangout" on the Common Core Math Standards using Google+.



Google+ also affords the use of Google Hangouts, a videoconferencing platform that allows multiple people at different geographic locations to interact online. These hangouts can be used to study lessons in remote classrooms, conduct discussions across buildings, or interact with experts from around the world.

2. Face-to-Face Opportunities

In addition to online opportunities, the ST@C strives to bring educators with similar interests and passions together to foster collaborations and create synergies. These "offline" interactions have the potential to develop relationships among educators so that the work "online" and the development of innovations can be more productive and fruitful. Some of the face-to-face opportunities we will be providing include ST@C sponsored Meetups, professional development sessions based on teacher interests or inquiries, and the promotion of ST@C sponsored conferences where teachers within our district can present ideas and learn from one another. As this evolves, we also anticipate that teachers will offer new ideas for creating additional face-to-face opportunities.

3. Inquiry and Research opportunities

With Online and Offline opportunities, teachers will have many opportunities to pursue inquiries in order to determine the effectiveness of their innovations. The ST@C will initially focus on supporting the following research studies:

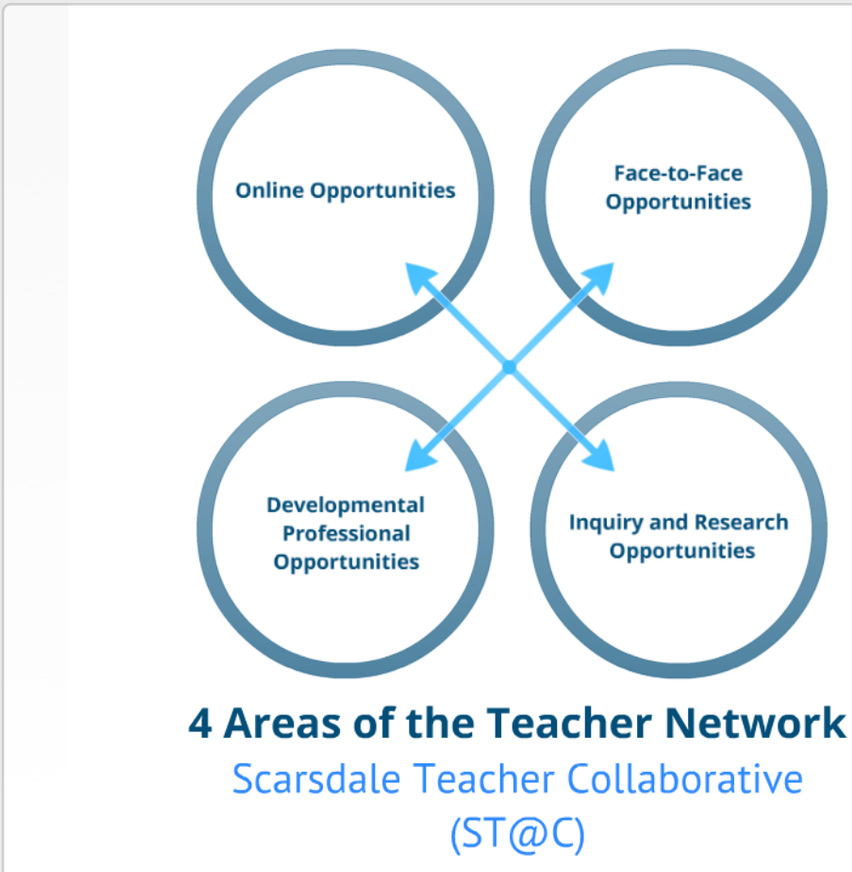
- The effect of having 1:1 devices in the classroom (iPad initiative in K-2, chromebook initiative in 5th Grade)
- Creating Dialogic Space and "Thinking Together" across K-4 classrooms
- Supporting the research of CFI innovation groups (ex. Reggio Emilio, Maker Spaces, and future grant groups)

We anticipate that as the ST@C expands, new themes and research projects will emerge as teachers will self-select and propose their own inquiries. The ST@C will adapt to support these teacher groups with new topics for research and development.

4. Developmental Professional Opportunities

Teachers go through various stages of development throughout their career. A majority of our elementary teachers have more than five years of experience in the classroom. As they progress throughout their career, they will benefit from professional opportunities and experiences that are different from earlier in their career in order to grow and sustain their interest in pursuing a career in education. While formats such as workshops and course work are still important venues for learning, different opportunities such as collegial coaching, formal presentations to diverse audiences (academic or community), and taking leadership roles in schools can help an experienced teacher gain new insight into their craft of teaching (Fieman-Nemser, 2001). When teachers innovate, they grow professionally and without this creative capacity, a teacher does not succeed or sustain their interest in the profession. Some of the upcoming developmental professional opportunities the ST@C will be promoting include innovative curriculum development and assessment, Scarsdale Teacher Institute courses, conference presentations, publishing opportunities, and teacher leadership opportunities.

INTERACTIVE 4.2 Four Domains of the ST@C



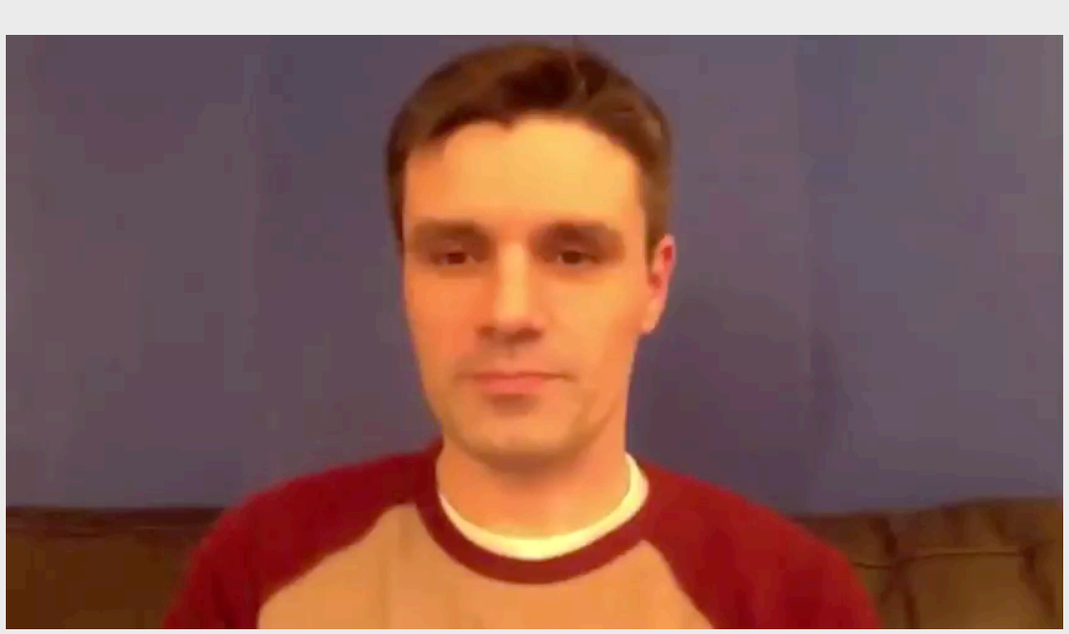
Monitoring the ST@C

The development of the Scarsdale Teacher Collaborative will be monitored through our own research study of the network over time. One aspect of the study will consist of an analysis of the social network over several phases. We will use survey data and network visualization software to help us determine the changing density of the social network and the social connections across different variables such as grade levels, school buildings, and/or specific teams. This analysis will provide us with information on how we can improve and develop the collaborative. Another aspect will target several factors such as trust and perception of innovation culture across the network. We will examine descriptive data by noting the interactions within the Scarsdale Teachers Collaborative to analyze the types and qualities of interactions over time to determine what factors encourage and promote teacher ability to innovate in their classroom. All of this data will be completely anonymous and for the sole purpose of studying and improving the social capital and collaborative connections among teachers.

Challenges for the ST@C

We found that our group process was complicated by traditional restrictions. We hope to take a closer look at how traditional systems and processes can either inhibit or promote innovation in order to figure out new ways to further adapt innovations more effectively. This shift from traditional thinking to new thinking was also evident in our own group as we were conceptualizing the ST@C. Originally, we proposed creating a group of teachers to form a core within the collaborative. As we researched further, we dramatically shifted our thinking from creating a small core group, which can seem elitist and closed, to creating something more open and accessible to all teachers in order

MOVIE 4.1 ST@C Commercial



The ST@C team created a commercial to help explain their learning network to elementary teachers.

to create "trust"--an important factor for collaborations and networks to thrive in the long term.

INTERACTIVE 4.3 ST@C participants learn about elementary programming and robotics.

Next Steps

Establishing the culture of innovation and the development of the ST@C is the first of three phases to this proposal. This project will also include the following phases over the course of the next three to five years:

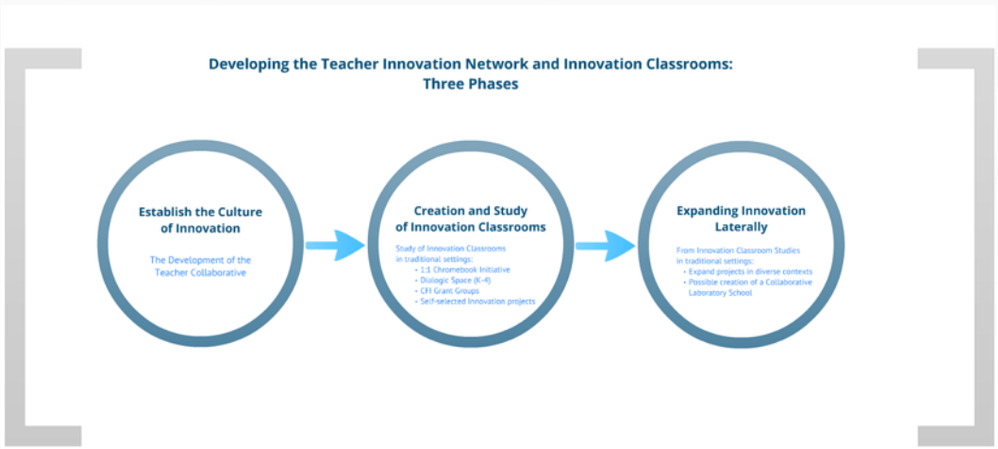
Phase 2: Creation and Study of Innovation Classrooms

In order for the Scarsdale Teachers Collaborative to research, develop, and collect data on student experiences over time, designated classrooms and/or flexible learning spaces are needed. Collaborative-inquiry classrooms are learning spaces in our elementary schools devoted to the research, experimentation, and development of innovative practice to further students' thinking. They are fertile grounds for developing young global citizens who will Know, Think, and Act as we envision with the Scarsdale Education for Tomorrow. They can also be places where students participate in the articulation of new innovations along with the teachers. These classrooms will be laboratories for the ST@C to experiment, examine, and study what students experience when they apply new theories and concepts into practice.

Phase 3: Organizational Development of Innovation Classrooms

From the work of innovation classrooms, studying new learning across developmental levels will be necessary to expand the innovation laterally. Innovations in education entail developing unique skills, strategies, and dispositions over time and often require a re-imagining or rethinking of traditional systems such as scheduling, curriculum, assessment, and environment to support new learning.

INTERACTIVE 4.4 Three phases of the ST@C Study



Organizational development such as assigning designated innovative classrooms across grade levels within a building or the creation of an alternative Collaborative-Inquiry Laboratory School at the elementary level are necessary in order for these new approaches to be implemented over time without threatening traditional programs. These designated innovation classrooms or the creation of a laboratory school give parents and students an opportunity and a choice to participate in these innovations.

Our hope is to ultimately design a system where teachers feel they not only can get the support they need to create and develop innovations in their classrooms but also support to articulate and share those innovations with the greater educational community. Through this collaborative and the collective dialogue between educators, our hope is that a counter-narrative will emerge to challenge the current discourse-- a narrative that promotes reform in education that is grounded in educator research and development, adapts relevant traditional ideas with new thinking of how to educate students for tomorrow, and utilizes modern tools to help students gain the knowledge, skills, strategies, and dispositions needed to succeed in a global community.

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Project Team

John Calvert (technology), Shoshana Cooper (fourth grade), Susan Luft (first grade), Carole Phillips (librarian), Paul Tomizawa (technology), and William Yang (technology)

CHAPTER 5

Promoting Reggio Approaches in the Scarsdale Classroom

A team of Scarsdale teachers researched the impact of the Reggio Emilia approach in primary classrooms. Their study examined a new way of classroom teaching that focused on student choice and authentic inquiry. This is their story.

"Those who danced were thought to be quite insane by those who could not hear the music." (Angela Monat)

The late afternoon sun streams into the Heathcote library through the large modern and stained glass windows, creating bands of color that dance across the bookshelves. Outside the trees rise as purple silhouettes in the winter light, but inside there is a warm glow. Slowly members of our group arrive in the colorful space. A transitional choreography takes place. Bags are set aside. The echoes of the day diminish. There are greetings, laughter, exhales. Members of the group quietly push together several tables, creating room for the twelve members to gather. We have come together to discuss our Center for Innovation grant and to marvel at this new opportunity. "Professional marvelers," Malaguzzi aptly calls teachers and in this new endeavor we gather to build on established relationships and to collaborate with a heightened focus (Vea Vecchi 2010).

Our group represents teachers from two of Scarsdale's five elementary schools, Edgewood and Heathcote. Most of the group has worked together for over seven years as members of the Reggio Emilia Study Group, a group that, under the auspices of the Scarsdale Teachers Institute, researches and interprets the progressive pedagogy of the schools of Reggio Emilia, Italy. The members of the group are thus

INTERACTIVE 5.1 Lorella Lamonaca and Lindsey Hicks share their work to colleagues.

comfortable gathering around the table, having spent many years in dialogue and debate.

The dynamics of our group are unique and evolving. As an entity with multiple members the group is finding its way, its rhythm, and functions somewhat like a musical group, a chamber orchestra, where every member has a forte that she or he brings to the group. This expertise when brought together heightens the group experience. The chamber

orchestra thus is our metaphor, not only for our CFI group experience but also for our approach to teaching and learning (Lisa Forte, Personal Communication).

The creation of the Scarsdale Center for Innovation, established in 2012, seemed a natural fit for our group. The CFI is structured to formalize and encourage innovative projects by teachers and seeks to "re-imagine teaching and learning, develop new models of instruction, foster widespread change, and learn how other organizations foster innovative practices" (CFI Website). The CFI's desire to explore "the transformation of pedagogy and benefits of collaborative group projects" struck a cord with our group. The time seemed right to contribute the work of our group to this initiative.

In January 2013 members of our group met with Scarsdale central administrators and Lella Gandini, the US Reggio Emilia Liaison. We discussed the history and progressive roots of Scarsdale education and considered aspects of the Reggio approach that could contribute to and transform teaching and learning in Scarsdale. During that conversation we identified areas of interest: deepening Scarsdale's approach to inquiry, the Reggio system of documentation, and the culture of equity in Reggio schools.

Our Project

Our CFI grant is a research and development grant and is entitled, "Promoting Reggio Approaches in the Scarsdale Classroom." Our group chose this title because the areas of our research are based on Reggio models. Our project entails research of: 1) the learning environment (space and culture), 2) inquiry, collaboration, and choice, and 3) pedagogical documentation. Lella Gandini is working with our group as a consultant.

The first phase of our project is the practice session, to extend our musical metaphor. The expertise of our members is reflected in the roles for the project that they choose for themselves. The Edgewood kindergarten and first grade teachers, Kim, Nancy and Michelle, seek to research their classroom environments and create intentional spaces that allow for negotiated choice. First grade teacher Lorella seeks to use materials to enhance writing and storytelling. Lisa Forte, the music teacher at Edgewood, brings her vision of a new music to her role as studio teacher in the Reggio sense. The computer teacher, Paul, contributes his technological skills as documenter and general support. The speech teacher, Ellen, serves as a documenter in Lorella's first grade class. At Heathcote, the principal, Maria, a strong advocate for the Reggio study group, is interested in the creation of an outdoor learning space in the school's atrium. The art

teacher, Alice, serves as the aesthetic consultant. Kindergarten teacher, Kathy, researches deepening inquiry through documentation. Heathcote's computer teacher, Erik, is steeped in student directed learning and brings this interest and passion to the group. Lindsey, the special education teacher, seeks to document inquiry opportunities in the Learning Center.

Our group has researched the innovative pedagogy of the schools of Reggio Emilia for a number of years and was drawn to the possibilities that the CFI grant afforded. Fundamental to the Reggio approach is an image of a strong and competent child who learns in a social context. Children learn in rich multi-sensory environments that allow them to express their strengths in '100 languages' (multiple intelligences). Unique to the Reggio Emilia approach is a strong emphasis on group learning and making learning visible through a highly specific system of documentation. It is this innovative system of documentation that our group will explore and use to make visible and assess the work we do with children (Gandini 2013).

As part of our research, members of the group visited the Reggio installation, Digital Landscapes, at MOMA's Century of the Child exhibit. This visit launched the collaborative, interschool project between Kristin Martin's CHOICE school seventh graders and Lorella Lamonaca's first grade class. CHOICE students, inspired by the exhibit and through their own study of light and shadow, created

INTERACTIVE 5.2 Digital Landscapes Activity

digital landscapes for the Edgewood first graders. Their research culminated in a collaborative exploration and play experience at Edgewood on May 21, 2013.

Also as part of our research, two members of the group attended the International Winter Institute in Reggio Emilia, Italy, where 250 educators from 50 countries around the

world shared their experiences with collaborative, inquiry-based learning and documentation. Additional conferences included the Lesley University Reggio Institute: Documentation, Design and Interpretation (April 2013) that focused on design principles and documentation, and the Portledge School conference: Shifting the Paradigm: Creativity as a Core Value (May 2013). These conferences examined how creativity affects thinking, knowing, and making choices as well as the alignment to common core standards and the use of assessment documentation. Throughout the year, we have consulted with Lella Gandini at the various conferences we attended. Ms. Gandini will return to Scarsdale on November 5, 2013 for a work session on documentation.

"Children grow into the intellectual life of those around them." Lev Vygotsky

The students in Kathy Leary's kindergarten class at Heathcote gather round a collection of fossils in their meeting area. Their inquiry study of fossils has sparked the interest of parents and other teachers who have donated additional samples for the children to study. Kathy grabs her camera, her documentation tool of choice that she now has at the ready to capture key moments of learning, and photographs the children as they pass around the new specimens. Throughout the fossil study, which began with the examination of a fossil in the nature corner, the children's questions have driven the direction of the inquiry.

INTERACTIVE 5.3 The Fossil Inquiry Project

"How did the shell get into the rock? and "Where did the animal live before it got into the rock? were questions that Kathy explored with the children.

The children's representations of their hypotheses, in the form of sketches and their own made fossils, guided their research. Following each additional acquisition of knowledge, Kathy gave her students the opportunity to

discuss and modify their hypotheses. The inquiry followed a pattern of discussion, representation of ideas, research and re-representation of ideas. Kathy's and the children's analysis of their documentation, her photographs and the children's conversations, sketches and questions, guided the direction of the inquiry. The inquiry study culminated with a surprise Skype interview with an actual paleontologist, Kathy's son, Alex, a student of paleontology at Oberlin College.

INTERACTIVE 5.4 The Purse Factory Project

MAYA RECOGNIZING HER PURSE ON DISPLAY (LEFT). MCKINLEY WEARING HER HAND-MADE APRON USING A SEWING MACHINE TO HELP HER MAKE A PURSE.

Meanwhile, the students in Lorella Lamonaca's first grade class at Edgewood squeal with delight as they hop off a bus in Scarsdale village to see purses that they made in class displayed in a local sweet shop window. Lorella's students have been busily creating a purse factory and manufacturing purses for the main part of the year. Lorella has worked with materials in her classroom for a number of years and has followed her classes as they created a myriad of creations with found materials. Lorella began this school year with a provocation on the materials table: How can materials help our story telling? The students explored materials during writing and choice times. The appearance one day of a sign on the writing center, "Prs facty" (Purse Factory) launched a fury of creativity that has lasted the entire year. From planning meetings, and additional materials, to problems created by new materials, from design lessons by parents

and teachers to sales of purses to support another classroom's community service project, Lorella has guided her students in their exploration of design, manufacturing and sales, as well as in their reading, writing, and math development. Lorella's documentation of the project has captured delightful moments of the study as when, early on in the study, Lorella entered the classroom to find a string of post-its on the black board. When she enquired about the post-its, the children replied, "We're taking orders!"

These class projects are examples of studies that derive from intentional environments: the light exploration of the seventh graders, the fossil inquiry in the kindergarten class and the provocation on the writing table in the first grade class. The projects challenge the thinking of what is possible for children at any age. The projects use documentation to explore the principles and possibilities of making learning visible. Ellen, the speech teacher at Edgewood, has begun a practice that we hope to duplicate in our project classrooms next year. She has scheduled regular time in Lorella's classroom to document the learning that is occurring. From her observations, she and Lorella have identified the steps they will take in the fall in terms of room design, use of materials and choice, and the next level of documentation.

Next Steps: Making Learning Visible

The team at Harvard's *Project Zero* has researched the power of group learning and documentation for the last ten years (www.mlvpz.org). In their latest book, *Visible Learners: Promoting Reggio-Inspired Approaches in All Schools* (2013), the authors have created a toolbox for American teachers for implementation of the concept and approach of 'making learning visible' through documentation. "The goal of inquiry and documentation is to create intellectual communities where children and adults develop their ideas and identities as learners and where students and teachers are active reflective participants" (Visible Learners 2013). In this paradigm, making learning visible makes learning possible. It is important to distinguish the Reggio concept of documentation from the North American expression of documentation (photographs, bulletin boards). Documentation in the 'making learning visible' sense, also referred to as pedagogical documentation, is the research story, the "traces of learning," "the educator's study of learning in order to figure out how and what to teach" (Carole Ann Wien 2011).

In their introduction to their book, Visible Learners, the authors discuss the demands of globalization and the new economy on the 21st century on school culture. They speak

of how “traditional forms of assessment and instruction focus on individual achievement and assessment” and suggest the increased “demands and ability to learn and function in groups.”Their questions: “How do observation and documentation of learning change the nature of learning?” and “What is the relationship between individual and group learning?” are questions that our research group is grappling with as we develop our own system of documentation. Our research team will use the approach laid out in the book, Visible Learners, in the next phase of our research and examine the power of group learning and the possibilities of making learning visible through documentation.

Lella Gandini describes documentation as a process of reciprocal learning, the history and narrative of an event that makes visible the voices of children and the engagement of teachers and promotes advocacy of democratic education (Gandini, Keynote Address, Lesley University, April 2013). Documentation in this sense reflects the value of caring how learning occurs. In this ‘participatory consciousness” the teacher is invited to inquire, to listen closely (Carole Ann Wien 2011).

Our research team brings with it individual passions and expertise. Our work together creates a heightened experience, a harmony. It is not without its frustrations and limitations. After all, we all still have our day jobs. Most of our collaboration occurs after hours, as the sun streams through now greening trees and open windows. The weather has become warmer now. The days are lengthening. June is calling to us. We will meet again to plan our work for the fall. We plan to restructure our teams in each school, to work together to analyze our documentation and in each of our practices make our teaching and learning more visible. We will use the book, *Visible Learners*, as our guide and our assessment tool. Our documentation will be, if not an entire symphony, at least the beginnings of an etude.

Benefits to Student, Teachers, and Families:

Intellectual: Children gain knowledge of concepts explored and develop language arts, mathematical, and content area understanding through a range of learning opportunities and through the power of long-term projects. Children demonstrate learning through flexible opportunities for performance.

Language Development: Students learn in a language-rich environment of conversation about ideas and develop social and pragmatic skills through the problem-solving structure and process of the inquiry approach.

Diverse learners: Students of varying strengths have access to ideas through the open-ended inquiry approach and multiple entry points.

Social Emotional: Through group learning students negotiate all aspects of their learning and develop pride and confidence through their work. Students learn with excitement and engagement.

Arts: Students explore concepts and develop understanding through opportunities for multiple representations of their ideas. Children have the opportunity to learn and explore through the "100 languages" of children (multiple intelligences).

Teachers share the learning experiences with students and become co-researchers. Teachers experience all of the above points.

Families: Parents share in the excitement of their children and learn about the power of long-term projects. Parents see their children as the "drivers of learning."

Each of the projects discussed in the article – the kindergarten fossil inquiry, the first grade purse factory, and the CHOICE School collaboration with the Edgewood first graders - provide evidence of the five principles of learning as described in *Visible Learners*.

Five Principles of Learning (from *Visible Learners*):

- Learning is Purposeful: Learning is relevant to the student, teacher and the world, and is shaped by student interest.
- Learning is Social: The experience and creation of knowledge develops through social exchange.
- Learning is Emotional: Experiences of wonder, joy, surprise and delight play a key role in motivating teachers and students.
- Learning is Empowering: Students take charge of learning and are self-directed.
- Learning is Representational: The evidence of learning is demonstrated in multiple ways.

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Project Team

From Edgewood

Kimberley Theall, Lorella Lamonaca, Nancy O'Rourke, and Michelle Inello, Ellen Fiorella, Lisa Forte, Paul Tomizawa.

From Heathcote

Maria Stile, Alice Yugovich, Kathy Leary, Lindsey Hicks, Eric Holvig.

CHAPTER 6

Game-Based Learning

Games give players permission to take risks that may be considered outlandish or impossible in a traditional academic setting.

Our team, eight teachers in diverse subject areas, is investigating how both technology-based and paper-based gaming and play can increase and improve student engagement in learning. Our premise is that play activates the determination and perseverance required for effective learning. Games give players permission to take risks that may be considered outlandish or impossible in a traditional academic setting.

All of us have witnessed that when we infuse academics with a simulation or game, maximum engagement and learning occurs. Classroom games inspire students to create, share, synthesize, modify, and comment on content to which they otherwise may be indifferent. Games also encourage active participation in the learning process and give students immediate awareness and feedback for what they know and need to know.

There are several gaming principles set forth by James Paul Gee (*What Video Games Have to Teach Us about Learning and Literacy*) that we find relevant to middle school teaching and learning:

Learners get practice in a virtual world that is compelling to them.

All aspects of the learning environment are set up to encourage active and critical engagement.

Learners can take risks in a space where real-world consequences are lowered.

For learners of all levels of skill there are intrinsic rewards from the beginning, customized to each learner's level, effort, and growing mastery, signaling the learner's ongoing achievements.

We have learned from the research that gaming is useful for students; it helps them resist coming to closure too quickly because it puts them in situations that enable them to practice as well as modify their ideas (Schwartz, Daniel, *Efficiency and Innovation in Transfer: Transfer of Learning from a Modern Multidisciplinary Perspective)*. Gaming promotes necessary learning capacities such as perseverance, resilience, learning from failure, and cooperation. These same skills are necessary for long-term achievement in life.

Gaming transforms a student's receptive role of learning to a more self-directed and active mode of inquiry. Students control their learning path, and along the way develop a set of "need to know" questions to guide them. Research shows that an effective learning sequence is when students first play a game, and then follow up with a presentation of related information. The game readies students to listen for and learn the information that is going to be taught.

Opportunities to Learn

In early March we spent the day at Quest to Learnn(QTL). Quest to Learn is a New York City, District 2, public school operating in partnership with Institute of Play. At Quest to Learn teachers, game designers and curriculum specialists work together to create a school that uses the underlying design principles of games to develop game-like learning experiences. Games are used to model the theme of "systems," another essential driver of the Q2L curriculum.

The Institute of Play is an organization with a mission to initiate "new models of learning and engagement." It employs two administrators and two game designers who work on-site with Q2L teachers to design games-both analog and digital-to support academic subjects. From our visit, we understood what is involved in creating a gamified community of learners.

We were especially struck by how the game designers were able to create custom-made games tailored to teachers' specifications. We saw beautiful board and card games that inspired us to start creating games ourselves. Immediately following our visit, all of us came away wanting to experiment with the use of games and gaming language in our respective curriculums.

Furthermore, from our visit we realized that universal access to technology is critical. Without universal access, it is difficult to proceed with large-scale digital gaming. At Quest to Learn every student has access to a laptop computer and is afforded access in all classrooms to different forms of digital media. We recognize that in order for us to move forward with digital gaming, it is essential for students to have universal access to technology.

MOMA Exhibit: The Art of Video Games

March 28th and 29th, some of our group visited a new exhibit at MOMA. The exhibit includes fourteen videogames from the past to the present. This visit gave us a sense of the progression of video games from the simple Pac Man years to current, elaborate virtual landscapes.

Games Learning Society: Wade Berger,
University of Wisconsin-Madison

We participated in a Google Hangout with Wade Berger from Games Learning Society. From Wade, we learned about current educational game research and about what resources exist for making games. He made us aware of the larger context of gaming, involving lively forums where participants go to discuss strategy and to improve their skills. According to Wade, there are a number of ways to gamify a classroom: teachers/students can design games,

MOVIE 6.1 Scarsdale Middle School librarian Sharon Waskow discusses how game-based learning could impact student learning.

students can play off-the-shelf games re-purposed for particular lessons, and teachers can create role-playing situations and simulations using gaming principles.

Rosetta Stone: Bryce Inouye

To help us learn what kind of thinking goes into making a game and to determine the feasibility of creating our own digital games, we spoke with Bryce Inouye, a Scarsdale High School graduate and a game creator at Rosetta Stone . He shared his insights into the logistics and realities of creating a digital game and introduced us to the term game mechanics. Game mechanics include: what makes a game interesting? how is it collaborative? what is the timing? how many people can play? and what can encourage competition? He suggested playing games both analog (non-digital) and digital in order to understand basic game mechanics. He highlighted two key pieces of a well designed game: the game matches the challenge to the interest and ability of the player and the game gives a ladder of assistance to the player as part of the working of the game.

MIT GameLab: Eric Klopfer, Jody Clarke-Midura, Josh Sheldon, and Scot Osterweil

We were excited to speak with a group of researchers from MIT's GameLab, to learn about the research they are doing on the impact of games on learning and to hear about their game development projects. Their research indicates that motivation is only one facet of how games impact learning. Games also encourage kids to persevere, learn from failure and set goals. They find that play fosters learning and pointed to ample research to support hands-on constructivist learning as in when kids make games.

They discussed how games can permit students to shine who might be reserved in a traditional classroom setting. They also cited research that showed that game playing coupled with instruction results in more measured learning than either activity alone.

Will Richardson

On May 7, 2013 a cohort of our group met with Will Richardson for thirty minutes. He gave us more insight on the use of games and how they truly work as an educational tool. He discussed games as having a "Zone of proximal development." This "zone" is the reason why games are popular. In the zone, the following occurs: there are challenges within the game, the game constantly reinforces, there is low frustration coupled with high motivation, flow learning is visually apparent. Games also offer total engagement, they are self-organized and self-directed, and problem-solving is a key component. He suggested the following skills to focus on that are natural in games: problem-solving, self-direction, failing well, and reflection.

We were especially struck by the concept of "failing well" and it's implication for teaching and learning. We are thinking about how to put this into practice in a gamified classroom.

Our group also participated in the following conversations and site visits:

- Google Hangout with James Paul Gee
- Games Learning Society Conference in Madison, Wisconsin
- Games for Change Festival in New York City
- Upcoming Events
- Meaningful Play Conference, Michigan State University (Fall)

Challenges

Our hangouts, site visits and personal experiences piloting games highlighted a number of issues or problems that pose a barrier to large-scale implementation of gaming in our classes. For one, making video games is complicated and time-consuming. A game-intensive school would need to hire programmers to work with teachers or explore other ways to harness technology to create a game-like atmosphere in the classroom. As a first step toward solving this problem, we plan to look into hiring Jesse Schell, a Carnegie-Mellon technology professor and CEO of a company devoted to the creation of transformational games, to create a custom-made game for our students. Or, we will explore collaboration with MIT's GameLab. Another avenue is to participate in a game creation Massive Open Online Course (MOOC) run by Stanford University or MIT. This would give us a foundation in game design and terminology for conversing with consultants we hire. Additionally, we are considering partnering with MIT GameLab or Games Learning Society to create and/or test out games.

Another obstacle is universal access to technology for implementing games. Without this, it is difficult to proceed with a large-scale, consistent use of digital gaming at the Middle School. However, we are not limiting ourselves to digital games and are exploring how to re-purpose commercial games as well as how to make games ourselves.

Student Experiences

Our experiments with games and play at the Middle School to date:

A new Minecraft EDU after-school was club created. Over 100 students participate in this computer simulation that allows the users to create structures out of lego-like cubes.

This activity challenged students no matter what their entry level skill. Students took the initiative to learn on their own. Students even taught themselves to make modifications to the game code. (One Middle School student runs the second largest public Minecraft server!)

Students showed versatility and willingness to experiment as they switched between different game modules. Collaboration patterns were distinct. Students sitting near each other while playing the game were likely to help each other, whereas those further away were perceived as more adversarial. Student "experts" showed leadership and commitment to make the club a success.

World Language Curriculum. Students played Spanish language board games, which allowed them to practice their language skills. Teacher-made digital games were used for unit review.

The games required students to reach specific levels of proficiency before they could move on. It was clear that students took special pride in mastering each level.

English Curriculum. Two Internet-based real-time survey programs (Poll Everywhere and Socrative), were used as part of a pre-reading activity for the study of Shakespeare's Julius Caesar.

Students were more focused and actively involved because of the immediate feedback.

Social Studies curriculum

> Grade 7: digital and paper games were used to teach the Bill of Rights ("The Bill of Rights: Do you have a Right?," from icivics.org), events leading up to the Revolutionary War ("Mission US."), "Roles of the President" (Scholastic magazine) and foreign affairs (especially the hard-to-grasp concept of how the French and British kept seizing American vessels, even though US policy was to remain neutral).

Students engaged from the moment they started playing the games, and many continued to play the games at home, even though they had not been assigned to do so. Teachers observed fewer behavioral and attention problems during games.

Games created an authentic learning environment that forced students to apply their knowledge, instead of merely memorizing facts. Games gave students a platform for taking risks without fear of being wrong. Students seemed to understand content on a deeper level. When reviewing content, prompts to "remember that game" led students to recall.

> Grade 8: Role-playing simulations were used to teach Roaring 20s (store-bought and modified) and Civil Rights (teacher-created).

Students showed enthusiasm and motivation for finding out what happened in history to predict what might happen in the game. Assuming identities forced students to dig deep for authentic responses.

Student Impact

In a survey of the literature, we have focused on how games lead to greater student engagement and why, whether or not there is transfer of learning from games to curriculum

MOVIE 6.2 Melanie Millard

Middle School Spanish teacher Melanie Millard discusses how her group's project allowed her to rethink assessment.

content, and whether or not games promote growth of critical and creative thinking.

On the topic of transfer, we've learned from educational gaming experts and from publications in the field that little research exists. The literature on transfer suggests that it is very difficult to assess whether it occurs during games (or in more traditional academic approaches like lectures, for that matter). Some experts suggest that transfer, defined as solving a problem the same way as before in an isolated situation, is faulty and that transfer needs to be more widely defined as "preparation for future learning." (Schwartz, Daniel, "Efficiency and Innovation in Transfer: Transfer of

Learning from a Modern Multidisciplinary Perspective." Information Age Publishing, 2005). Using this definition, games clearly have been shown to make students more receptive to future learning. Professor Daniel Schwartz of Stanford calls this "transferring in." Schwartz has shown that students who play a game first as a motivator or activator before a lesson are much more receptive to the subsequent lesson than those who only got the lesson or those who got the lesson first and the game second.

Many have observed a number of features of gaming that increase engagement. Games directly engage students, as they become players and not just watchers. Students can take on different identities and take risks they might be reluctant to take otherwise. Every teacher has observed that students find it hard to cope with reams of information at a single time; with games, they learn what they need when they need it, making games an ideal vehicle for "just in time," "on-demand" learning that sustains student interest and increases engagement.

Based on the literature and on our observations so far, we know that games promote thinking about relationships between multiple variables rather than isolated facts. This attribute of games makes a district-wide move toward greater use of games very much in keeping with our goal of fostering creative and critical thinking. Games provide an alternative to the linear experience provided by, for example, books. "Gamemasters" (ie., the teacher or the digital program) control the pace and sequence of a game by introducing new, frequently unexpected, variables. This pushes students to rethink pre-conceived logic.

Every Middle School teacher knows that relatively inexperienced thinkers resist deep and innovative thinking, tending instead to go with the first idea that comes to mind. Literature on cognitive habits of mature versus immature thinkers corroborates this observation. Researchers have found that gaming is particularly useful in helping students learn to resist their initial ideas about a particular problem

MOVIE 6.3 Scarsdale Middle School librarian Sharon Waskow discusses future plans for the game-based learning team.

and to put them in situations in which they can experiment with changing locked-in beliefs. Traditional educational practices train students to be efficient rather than innovative. Today, students are more geared to efficiency than ever, since they have a huge reservoir of information at their disposal and have a tendency to accept current assumptions and knowledge just to cope with the vast quantity of information at hand. Because gaming allows students to take risks, try out multiple scenarios and explore “what if,” it gets away from the efficiency model of education that says speed trumps innovation. Such a shift can only have a positive impact on learning.

Final Assessment

After all our research, using games in the classroom, site visits, consulting with experts, and conference-going, we realize that many possibilities exist for transforming the way we teach and the way kids learn. For our next steps, we plan to roll out more implementation trials, partner with game creators, and develop a menu of possibilities for integrating game-based learning throughout the Middle School.

Project Team

Jeanne-Marie Castiello (Social studies), Denise Del Balzo (English), Cara Hiller (English), Melanie Millard (World Language), Janet Milliken (Social studies), Michael Pincus (Technology), (Meghan Troy (Department Chair, Social Studies), and Sharon Waskow (Librarian)

Chapter 7

Middle School Service Learning

Through service-learning, young people use what they learn in the classroom to solve real-life problems. Service learning at the Middle School helps our students see themselves as members of an interdependent society able to impact change on a local and global level

Overview of Service Learning Model at the Middle School:

According to the National Service Learning Clearinghouse (NSLC), “Service-Learning is a teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities.” Through service-learning, young people use what they learn in the classroom to solve real-life problems. Service learning at the middle school helps our students see themselves as members of an interdependent society able to impact change on a local and global level. It embodies the District motto of “non-sibi,”not for oneself, and fosters a greater appreciation for the needs of others in our community and our world. Gaining the ability to empathize with others through service learning is also a key component of The Scarsdale Education for Tomorrow’s Core Curriculum.

Sixteen teachers at SMS were awarded an Implementation Grant for the 2012-2013 school year. This grant enabled middle school teams to move the service learning initiative from discussion and ideas into real-world practice. Each project included in-depth instruction on a topic, meaningful service learning related to the topic, followed by student reflection.

Team Reports:

Music

SMS performance groups held a concert at the Open Arms Shelter in White Plains.

To prepare for the performance students viewed a documentary on homelessness in Westchester County. The fact that there is homelessness just two miles from SMS initiated a discussion about Open Arms Shelter and poverty in our area; an eye-opening event for the students, especially for the students that had previously not been involved in a service-learning project. One student was so moved that he immediately proclaimed, "I feel compelled to help!"

On the evening of the performance, even after careful planning, communication and preparation, we were faced with challenges we had not anticipated. Due to the second story location and fire escape-like staircase, it was difficult loading and unloading the gear (multiple keyboards, large percussion instruments, guitars, amplifiers, etc.). However, this created a happy coincidence when the community members eagerly jumped in to help carry equipment. Additionally, the help of parents in attendance, chaperones, and students exemplified the feeling of community that happens when everyone works together towards a common goal. True service learning in action! The joy of the students,

parents, teachers and chaperones, combined with the warm reception from the community, reaffirmed the importance of this project and provided the reality of poverty a few short miles from our school.

Popham Six

Every year the Popham sixth graders are introduced to the concept of human rights with lessons about the definition of human rights, Maslow's hierarchy of needs, and the difference between the rights of children and the rights of adults. This year students looked at poverty in Westchester. Through "Spent," an online simulation, the sixth graders experienced the decision making process that many local families making minimum wage or less must endure. The hard choices and real-life cost of living scenarios that are part of the simulation lead to discussions and understanding about the cycle of poverty. It also sparked awareness of local food banks and agencies, and the services they provide. In science, students learned about the "My Plate" initiative, and the basics of nutrition. The students made great efforts in bringing in healthier options for the SMS food drive. They were able to brainstorm healthy and affordable contributions, and the food drive was a great success.

We partnered with the Grace Church in White Plains to create "snack packs" for the after school-mentoring program.

When reflecting about their experience learning about local poverty, students recognized the things that they take for granted, such as safe, comfortable places to do homework, and having trusted adults that can help them.

Popham 7

Popham 7 used the Hunger 101 curriculum as well as the PBS Frontline documentary *Poor Kids,* to delve deeper into the issues of food insecurity, the working poor, government and community responses to hunger and poverty and the emotional effects of poverty.

The action/service part of our initiative had three distinct phases. In January, Popham 7 began collecting non-perishable food for the SMS Food Drive. Having a better understanding of the problem of food insecurity, the students rose to the challenge and collected almost 1200 cans in two weeks! All 89 students then visited the Food Bank over two days to volunteer. On the first day, 45 students assembled 1800 fresh produce bags for the Green Thumb. They also assembled backpack bags of food for elementary students in Westchester. The second day, another 45 students scooped, measured, and bagged one-pound portions of rice for distribution at local pantries and community programs. They packaged almost one ton of rice.

Our connection to the Food Bank continued through our fresh herb program. In Science, students planted herb seeds in window box planters and have been responsible for watering. The fresh herbs, including basil, cilantro, parsley and dill, intended for the Green Thumb Program, did not grow well indoors in the winter. We are therefore planning to grow the herbs this summer at home and then begin the 2013-14 year with mature plants to see if they can be maintained in the classrooms.

Finally, in partnership with the Grace Church Community Center Soup Kitchen, we have started Popham 7 Cooks with Compassion. Students volunteered to cook dinner for the 80-100 clients at the Soup Kitchen. We prepared 5 separate meals including baked ziti, fresh-baked Cookies, Mexican casserole, homemade salsa and salad.

Service Learning in Fountain 7

Students explored the causes of poverty and what life is like for people living in poverty through various activities. After viewing the powerful PBS special *Poor Kids,* we kicked off the can food drive.

In addition all students in Fountain read *Wonder* and were asked to focus on the idea that each person has to take responsibility for his/her actions, and should try and make the right choices to help others. On Human Rights Day, each student wore a shirt that said, “Choose to be kind,” to emphasize that actions matter.

Finally we took the students to the Westchester Food Bank, where students actively became involved in service learning. Students spent the day packing rice that would help feed thousands. This initiative clearly helped students understand poverty and food insecurity in Westchester County.

Service Learning in Fountain 8

In Social Studies and English classes, students studied the impact poverty has on food insecurity in Westchester County. Students in Social Studies connected events of the

past to problems in the present: How the progressive movement in the early 1900s sought to create social and economic change through government interventions, and how the federal, state and local governments do the same in 2013. Students studied the causes of poverty, and looked at agencies that work to ameliorate poverty.

As instruction was being conducted students were being asked to participate in the Student Organization's school wide canned food drive. *Even after* the direct teaching of poverty and its impact on children and families, and the reading of *Wonder*, many students forgot to bring in cans for the canned food drive.

After two days of no cans and much education on poverty, we personalized poverty by focusing on the stories of four individual children. The next day almost all the students brought in cans. We discussed their change of heart. This was a powerful learning experience for the students. Until they connected personally with the plight of poor people they were not as motivated to "do the right thing."

Finally we took the students to the Westchester Food Bank, where the students met with Nancy Lyons, who showed the students the backpacks of food that are sent to students at local schools every Friday. The Scarsdale students were surprised to learn one of the schools was just one mile from Scarsdale Middle School! This field trip took the students out of the classroom bubble and gave them a hands-on service learning experience that they will not quickly forget. A canned food drive will never again be "just" a canned food drive.

Service Learning in Cooper 6:

Visiting and spending time with elderly Scarsdale Residents as part of Meals on Wheels

To build on students' growing awareness of empathy skills and behaviors, students were given a valuable life experience: Give to others and do 26 acts of kindness. In total, the sixth grade completed 2,392 acts of kindness as a tribute to the victims of the Newtown, Connecticut shooting.

Students were told (and soon experienced) that the smallest acts of kindness were just as important as the larger ones and that giving can be more fulfilling than receiving. In addition to enriching the Scarsdale Middle School community, students participated in acts of kindness of their choosing outside of the school.

As they embraced this initiative, the Cooper House sixth graders were awe-inspiring. Their acts of kindness turned out to be special and unique. Each student maintained a community service log and was asked to reflect on which act of service was most meaningful to him or her. The students

wrote essays on what community service meant to them and why community service is important.

Some of the service projects included: volunteering in soup kitchens, Meals on Wheels and ASPCA; adopting a family for the holidays with warm winter coats and gifts purchased with allowance money; assisting children with physical or emotional disabilities to learn to play soccer; visiting patients in hospitals; corresponding with troops serving in Afghanistan; making and selling bracelets for Leukemia, Lymphoma, and Myeloma research.

The sixth graders performed one final act of community service as a group: In early February, the entire Cooper House sixth grade at Scarsdale Middle School volunteered at the Food Bank of Westchester in Elmsford, New York.

Continuing on with the theme of service learning Cooper 6 throughout the spring were involved in an initiative to help students at Public School 150 in the Hunts Point Section of the Bronx. Many of the students who attend Public School 150 do not have the basic clothing to attend school or other functions. Realizing this problem our students decided to participate in a Cooper 6 clothing drive. The students over several weeks collect various clothing items. After school students sorted the items and over the Spring Break clothing was donated. The clothing was used in what Public School 150 has designated as a school run store. Families on weekend can come to the school and shop, free of charge, for clothing and other household items. The students at Public School 150 were so excited about receiving the clothing for their store that they wrote personal thank you notes to each Cooper 6 social studies section.

Collecting and sorting clothing for Kidz Klozet and P.S. 150.

Butler 7

Students in Butler 7 brainstormed ideas about the causes, the effects and solutions to poverty. Students then established the definition and scope of poverty, reading a New York Time's article "America’s Lost Decade" which talked about the definition of poverty line and contained statistics and demographics and how the number of people in poverty has risen in the last decade. We then used the NY Times Neediest series to profile different stories of individuals in poverty to give the kids a face to go with the statistics. We watched "Poor Kids," a Frontline documentary, and visited the Jacob Burns Film Center to view the film "Brooklyn Castle" a documentary about an award-winning chess team from an inner-city school, and were joined by the film's director for a Q and A session. We were visited by Jenna Horowitz, a social worker from a Yonkers public school, who talked to the students about poverty and education. Students researched a more specific aspect of poverty (jobs,

housing, healthcare and nutrition and education) and wrote a position paper in which they defined the problem and the connection between poverty and their topic, and proposed solutions.

Cooper 7

The United States has a long and storied history in respect to war veterans and we continue to write that history each day American service men and women return home from areas of conflict. With this in mind, we have established a relationship with the New York State Veterans' Home in Montrose, New York. This year, students will conduct a supply drive and create care packages for the veterans. A group of students will deliver the goods to the home and document their visit. They will share their experience with the Cooper 6 students in order to "pass the torch" for next year's project.

As we look to next year, we plan to broaden the scope of the project and create an ongoing relationship with the home. We will use the school garden to grow flowers, herbs, and pumpkins to bring to the veterans throughout the year. We will embrace Veterans' Day as an opportunity to show appreciation and respect for their service. In class, students will research and discuss current data regarding brain injuries, Post-Traumatic Stress Syndrome, homelessness, and drug addiction in order to better understand and empathize with the obstacles returning vets may face. Students will generate ideas about how to best show support and appreciation for those who have served our nation. As the project grows and expands, so will the opportunity to include more subject areas (i.e., science, family and consumer sciences, health) as we build a curriculum that works in tandem with the project.

Butler 8

Butler 8 social studies students **"shared the love"** when they presented their service learning projects on February 14th. Students learned about the Gilded Age and Progressive Era in social studies. On Human Rights Day, the Butler 8 team all presented various lessons on Americans in need. **Then students researched related topics that they found interesting and carried out acts of service all over the tri-state area.** One student commented that it "opened up my eyes and I really loved it" and that "by teaching them (children at an elementary school program in Hunts Point) I think I learned way more than I ever would in school." The students will continue to reflect and learn about empathy and group work as the year progresses.

World Language

Grade 8 French

World Language students in all eighth grade houses connected to the CFI service learning in their endeavors leading up to Human Rights' Day and the role of empathy in our school. They discussed and presented thoughts about how our school's initiatives in understanding others in daily situations and often being asked to step out of one's comfort zone has effected them. The students conducted these conversations in French and participated in a shared inter-class meeting. Some of the students' reflections after the activity ended were: "I really liked talking to other students that I wouldn't normally see about empathy and it was a good challenge to do it in French." "I guess learned that I can't really empathize with those who I don't know or who I can't understand their situation." "I think that I need to think a little more about those in my area who aren't as fortunate as I am."

Popham 6 French

Sixth grade students are participating in growing their own herbs in our world language garden plot to share with the Popham seventh graders as they provide fresh herbs for inclusion in the Green Thumb activity. The students are learning how to prepare, plant, and cultivate herbs, which may be donated for either fresh or dried use. The understanding for this endeavor will be carried through to their seventh grade experience next year. They are learning that it takes a lot of herbs to donate!

Cooper 6 and Popham 6 French

Students are learning how children their own age in other countries may deal with not having enough money to purchase sports equipment. Specifically students will read an article about DYI soccer balls made by children in Africa. They will learn to express in French what they recycle at home and how could any of the recyclable materials be used to make their own "sports piece of equipment". They will imagine how to deal with the issue that the children in less fortunate circumstances may act. They will also learn simple commands in French for playing the sport and use the piece of equipment, which they created.

Conclusion:

This project was a success because it actively engaged students in an area of social injustice. Students learned about the topic in depth, and had to reflect on their actions. These service-learning projects were a great success because they physically and mentally connected the students with a significant issue in their own backyard.

We look forward to continuing the service learning projects established this year and are excited to bring additional faculty and teams on board for the 2013-14 school year. Our model will remain the same: In-depth instruction, meaningful community service, and student reflection.

Project Team

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CHAPTER 8

Creating Authentic High School Global Learning Experiences

Under the aegis of the Interdependence Institute, this proposal aims to increase global awareness of current world issues and problems, which may be locally embedded.

Overview

The aim of this proposal is to develop an inter-term educational redesign for the high school that focuses on extended experiential/service-learning opportunities for all students (possibly an extended week on either side of the February break). This proposal aims to increase global awareness of current world issues and problems, such as those discussed in J. F. Rischard's High Noon: 20 Global problems and 20 Years to Solve Them (Basic Books, 2002). It also provides opportunity for peer to peer interaction locally, nationally and/or internationally. The proposed inter-term experience would also focus on "new" ideas that are shaping the education students will need to be successful in an expanding 21st century interdependent world. In preparation for this "new" world, students not only will need significant content knowledge, but must also be innovative, imaginative, and open to multiple perspective views. This experience aligns with the Scarsdale mission focus of preparing students for a life of service, non sibi, and with the Scarsdale Education for Tomorrow with its emphasis on critical and creative thinking applied to real-world problem solving.

The experiential/service learning experience would have an academic component, which could involve, among other

possibilities, some of the following: (1) a pre-service academic component that provides context and background for the experience; (2) a post-service component that includes reflection, writing, and shared discussion and analysis; (3) presentations in school and for the community.

The emphasis of the initiative is on project-based learning with attention to real-world problems. Authentic situations and inquiry are at the heart of the project. Aspects of this kind of learning involve seeing the big picture, or understanding the various contexts of real-world problems; imagining possibilities for moving toward solutions; being open to strategies for discovery of self and others; developing project management strategies with teachers and fellow students; and creating and sustaining a professional learning community. Additional components of this inquiry-

based approach include multiple opportunities for reflection and revised thinking, meaningful kinds of assessment, and understanding of cross-cultural engagement and multiple perspectives.

Preliminary Activity

Members of the Interdependence Institute committee had the opportunity to meet with leading educational reformer Yong Zhao, who visited Scarsdale to speak with faculty, administration, and parents. During our conversations, Professor Zhao suggested a number of strategies for how to help schools and their students develop a truly global perspective, including the right knowledge and skills necessary for today's and tomorrow's education. Yong Zhao's educational values align powerfully with those of Scarsdale, and include (1) an education that respects individual talents; (2) one that supports divergent thinking, tolerates deviation, and encourages creativity; (3) a system that avoids being driven by government mandates about teaching and learning; and (4) an educational culture that thrives on honest communication, rich collaboration, and respect among all participants and stakeholders. Dr. Zhao has generously agreed to serve as a consultant as we develop the details of the project.

During the initial phase we have also investigated how other schools have introduced experiential/service learning opportunities on and off their respective campuses. We have begun researching how these schools have fostered global awareness and inter-cultural understanding.

The questions guiding our investigation are, essentially, three:

- How can a school create and implement a set of authentic experiential/service learning experiences that connect to its educational mission?
- How can these learning experiences be productively linked to the academic curriculum?
- What kinds of meaningful assessment practices can be developed to evaluate what students (and participating faculty) learn from the experiences?

Members of the committee visited the Avenues School in NYC. This newly opened operation, currently K-9 and soon to be K-12, is designed as a global school, one of twenty such schools to be established around the world within the next decade. The school's community engagement in terms of global perspectives and experiential learning is currently in a formative stage. Our own education design represents a more advanced stage of development, especially in terms of vision and planning.

Members of the committee also visited the Maret School in Washington, D.C. This K-12 private school has a well-developed program of service learning integrated into all levels at the school. The strong sense of community and cooperation has forged links with local, regional and global organizations to provide students with numerous opportunities. The service learning projects are tightly integrated into the academic curriculum at all levels. Maret piloted a multi-school program called the Horizons Project. This program provides a summer enrichment program and school year Saturdays to help a diverse group of K-8 students from low-income families improve achievement at school.

Maret School offers students several summer programs including Live/Learn experiences in Honduras, India, and France, as well as a China Exchange and a community service travel opportunity in Ethiopia. These programs all emphasize experiential learning as well as community service.

During the month of February, students and faculty embark on a week of "out of class" projects during Intensive Study Week. ISW adventures include excursions beyond the DC area as well as on-campus opportunities. Students may travel to North Carolina for Habitat for Humanity, perform in NYC with the choir, study theater arts through professional productions or engage in independent community service to name a few.

All or parts of these initiatives may be adaptable to Scarsdale High School.

Visits have been planned for three additional schools :

- The Metropolitan Learning Center, Hartford, CT.
- The Ross School, Long Island, NY.
- The Head Royce School, Oakland, CA

Focus Groups

A number of focus groups have been held with students, teachers, and parents to assess the viability of such an initiative.

Benefits/Values

A number of benefits were cited by the various groups, such as opportunities for bonding with friends across grades and for becoming independent. Most frequently cited was the value of gaining a deeper appreciation of another culture, through immersion, through comparing different family structures, through close person-to-person contact, which can be transformative. The resulting cultural broadening (breaking out of the Scarsdale bubble) was found to open the

minds and hearts of participants. The dynamic of the classroom was appreciably enriched, bringing the curriculum to life, making it authentic through the varied experiences of cultural exchange.

Obstacles/Challenges

Some obstacles and challenges to implementing a more extensive series of cultural exchange and visitation experiences involve issues of logistics and of academic workload. The school schedule is already tightly packed with both academic and extra-curricular programs and demands. Scheduling conflicts already exist among different groups' trips, and they might further conflict with family vacation plans. The academic burden for both students and teachers would increase as time would be taken for the cultural exchanges. Other challenges include cost, linguistic barriers, and added stress as students struggle to catch up on missed academic work.

Suggestions/Improvements

Among the suggestions for improving current trips are arranging for more interactions with local teenagers, limiting the size of the groups, preparing more thoroughly before travelling (cultural sensitivity/language/history) and hearing from those who have participated previously. Debriefing sessions were recommended, along with more sharing with the school at large upon return to incite others to participate in at least one of these experiences during their 4 years. Additional suggestions included creating an STI course to design curriculum, adopting a theme for the school, getting buy-in from a wide range of stakeholders, having a book day when all read and discuss the same book and participate in a day of service, building in follow-up, reinforcing opportunities, taking advantage of technology, including Skype, and reinforcing the year's academic learning with special summer teacher-led excursions. An emphasis was given to ensuring that service learning has a clear and strong curricular connection. For financial support, it was advised to connect with service groups, such as the Rotary for financial support, and to establish partnerships with corporations and religious organizations for financial support.

Possibilities: Inter-term Educational Design or Future Global Academy or Global Research Module

More than ever, students need to engage in observation, reflection and critical thinking with regard to global issues and challenges in both the developed and developing world. The best way to provide these opportunities for students is to have a strong global academic learning environment along with student engagement in service-learning experiences on the local, national and/or international arena. In this manner,

students will better understand that issues concerning civic responsibility, gender, equitable distribution of resources, malnutrition, the environment, and immigration among others are truly global.

The purpose of an Inter-term Experience, Global Academy or Global Research Module would be to provide students with an academic learning environment and a service-learning experience in which to study global issues. It is difficult to set up such learning experiences in the context of the current school calendar, as students and teachers have academic responsibilities to and for which they are accountable; therefore, we have begun visiting schools that already have embedded both global and service-learning experiences/modules within their existing curricular offerings to learn how they have approached this task.

Our overall aim is to prepare students with knowledge of the wider-world that they will be living and working in whether it be an inter-term educational redesign where all students will have an extended experiential/service-learning opportunity during their high school years or a research type course where students would be able to engage in intensive global study or the establishment of a Global Academy within the high school devoted to global issues from a variety of disciplines/perspectives. These are a few models the team has considered this year after researching, discussing, and visiting both the Avenue School in New York City and the Maret School in Washington, D.C. Next fall we hope to visit several more schools to observe and learn how they have addressed experiential/service-learning in a global context.

Overall, the team is committed to experiential/service-learning embedded in an academic program as a way to enrich student understanding of the world today. These students are young people who see themselves as agents of change or problem-solvers to the varying problems facing the planet.

By creating an inter-term, more students would be able to engage in experiential learning opportunities than are currently able to do so with the traditional high school schedule.

The High School has established a number of connections with organizations such as the East-West Center, the Adakum Foundation, and the Hwa Chong Institute. An inter-term would allow the high school to develop more partnerships with local and national organizations and provide more opportunities for faculty to develop and integrate experiential learning into their curricula.

An inter-term would allow students to engage in experiential learning opportunities without the pressure of having to

make-up work missed or take school work with them while they are engaged in travel and/or projects.

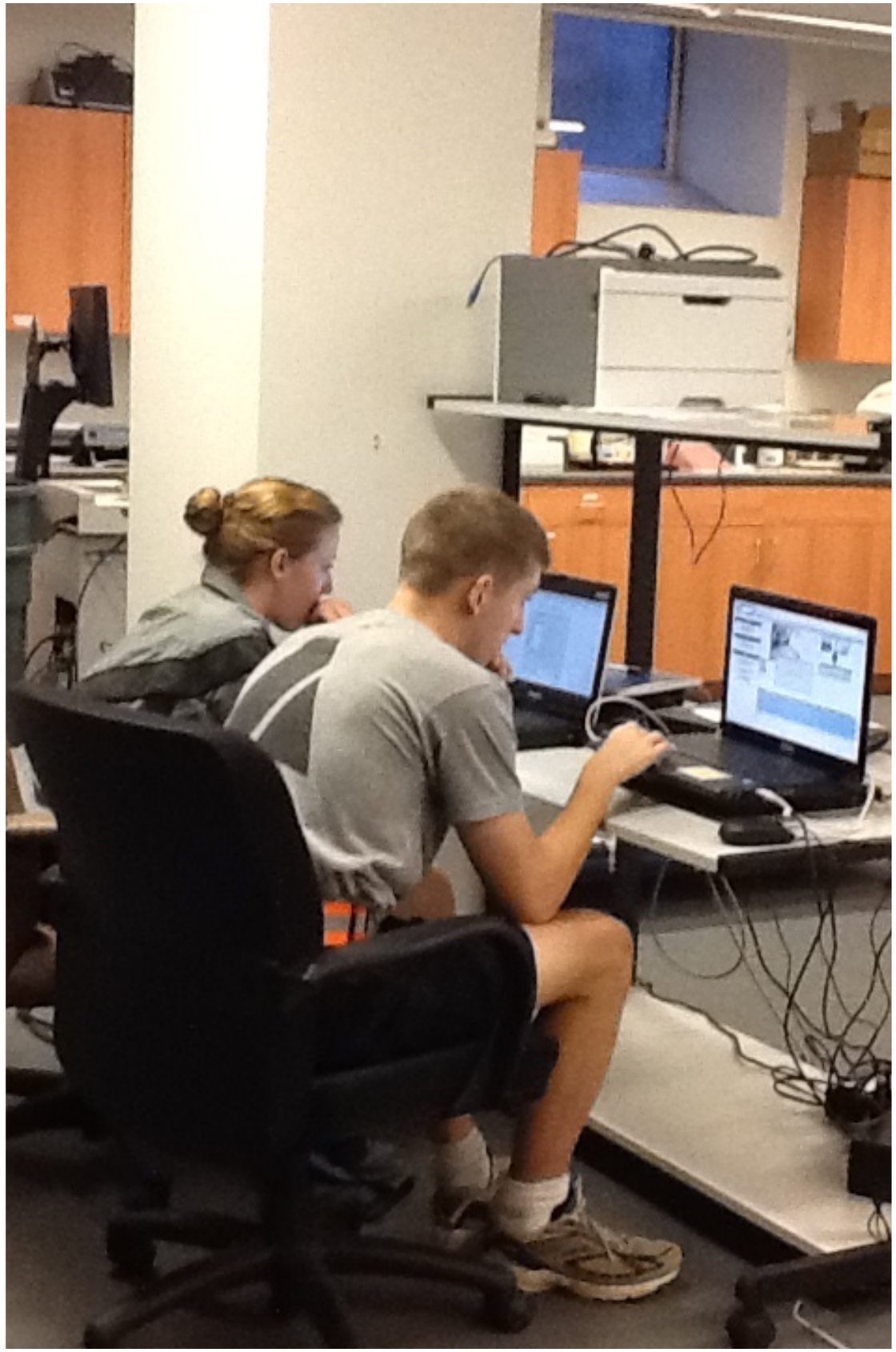
An inter-term would put greater emphasis on cross-cultural understanding, whether local, national or international, through experiential peer to peer engagement. Many of our students have already reported that these types of experiences can be transformational.

Project Team

Ken Bonamo, Kendra Claussen, Sylvie Corten, Robert DiYanni, Laura Estersohn, Gwen Johnson, Nicola Manchillo, Ann Marie Nee, Sue Peppers, Maria Valentin, Joan Weber

CHAPTER 9

Health, Nutrition, and Wellness: A Physical Education Curriculum for the Future



A team of Technology, Physical Education, Science and Health Education Teachers began to create and develop an interdisciplinary curriculum that unites health, science, technology and physical education. The team examines how current trends in health, wellness, physical activity, nutrition and exercise science can be integrated into the course of study for students at Scarsdale High School.

Overview

This project redesigns and re-imagines how we approach teaching and learning in High School Physical Education. A team of Technology, Physical Education, Science and Health Education Teachers began to create and develop an interdisciplinary curriculum that unites health, science, technology and physical education. The team examined how current trends in health, wellness, physical activity, nutrition and exercise science can be integrated into the course of study for students at Scarsdale High School.

This project also explores the development and design of a Center for Health, Science and Learning. This project allowed the team to research facility design, equipment and room layout curriculum opportunities in the areas of Bio-kinetics, Exercise Physiology and Health Science. While there are currently no specific plans to build the proposed facility, our team hopes that a Scarsdale Wellness Center can be included in a future facilities plan.

The project also included opportunities to research local, national and global societal issues around health, nutrition, wellness and physical activity. The plan is for students and staff to begin the design and the implementation of workshops, seminars and the opportunity for community outreach and community service programs in these areas.

Site Visits Inform Our Thinking

The project team organized three site visits. The team toured the West Point Strength and Conditioning facility at the U.S. Military Academy at West Point, New York. The visit included seeing the Physical Education Department Facility, the Department of Kinesiology Laboratory and meeting with professors in Sports Psychology, Physical Education and Kinesiology.

The team also toured the John Jay Cross River High School Fitness Center facility. We met with the Director of Athletics and Physical Education, discussed facility design and layout, curriculum, scheduling and staffing.

The team also had the opportunity to visit the Nicholas Institute for Sports Medicine and Athletic Trauma in New York City. The team spent time with exercise scientists, sports nutritionists and physical therapists, learning about latest research and technologies in the field of exercise science.

Members of the team also attended several meetings over the past eight months that included meetings with Board of Education members, District architects and District administration. The team coordinated and attended meetings with student focus groups, physical education teachers and coaches. These meetings were to provide opportunities for

staff and students to share their input into the proposed design, layout and philosophy of a newly conceived space.

Our work will have a direct impact on students. The development of a Health, Wellness and Learning Center would provide all members of the Scarsdale High School community with a place to learn about and experience, whole body health and wellness.

In addition to research and site visits, the work that was completed last year included the development of the mission statement and goals document found below. The following program information was shared with all members of the Scarsdale Community.

Project Mission Statement

Our mission is to inspire the Scarsdale Schools community to value the importance of a healthy and physically active lifestyle through an interdisciplinary curriculum that examines physical fitness, health science and the societal and global need for health promotion.

Program and Facility Goals

The goals of the Scarsdale High School Health, Fitness and Learning Center are to:

- Offer learning experiences that emphasize awareness, prevention, and positive health behavior change.
- Create student directed community outreach programs that focus on current health related issues and trends.
- Design courses of study in exercise science, technology and physical education that will inspire students to think critically and creatively about their learning and pursue further study in community health related fields.
- Foster an environment that is supportive of all students to lead a healthy lifestyle.
- Design a gender-neutral wellness facility that will meet the needs of all our students.

General Information and Project Outline

The project plan was to design a renovated facility and the interdisciplinary physical education curriculum that supports it is being developed by a team of educators from various disciplines in the Scarsdale Public Schools. Those disciplines include Health Education, Science, Technology and Physical Education.

The CFI grant allowed our team to perform research, conduct curriculum design meetings, meet with architects, go on site visits and bring in expert consultants in the areas of modern fitness, exercise physiology, holistic wellness concepts, and fitness center equipment design and layout.

Current Design and Curriculum Development Status of a Proposed Scarsdale High School Health, Fitness and Learning Center

Last winter, District architects and the CFI-Fitness Center committee met and created a basic construction plan for a proposed Center.

The CFI-Fitness Center team designed the space with consideration of the following elements: Cardio Space, Turf/ Runway General Purpose Space, Selectorized Plate Equipment, Free Weight/Dumbbell Space, Multipurpose/Lab Classroom, and Power Rack Systems for functional fitness.

The project team worked with an independent consultant, Rick Moser, SHS ’74 on the equipment selection and layout design of the space.

The project team hosted a student focus group meeting to solicit student feedback on the issues and limitations of the current weight room, enhanced physical education and health curriculum and ways a new Wellness Center would meet the needs of our entire Scarsdale High School student population.

The CFI-Fitness Center project team met with Scarsdale High School physical education staff and coaches to discuss physical education curriculum implementation during the school day and how to meet the needs of all our student’s afterschool. The committee is also looking at ways to design a facility use schedule that will ensure all students will have the opportunity to use a Wellness Center after school hours.

The CFI-Fitness Center team is currently meeting bi-weekly to discuss high school physical education curriculum design and implementation. Curriculum ideas include courses such as, Modern Fitness Components I, Modern Fitness Components II, and Advanced Strength and Conditioning Concepts. Interdisciplinary courses such as, Nutrition and Wellness, Bio-Kinetics and Exercise Physiology are also being explored.

The general physical education 9th and 10th grade curriculum is being reexamined to incorporate the use of the center for a holistic, lifetime wellness approach. The Science Department is examining ways the center can enhance instruction in the freshman Biology course as well as discussing ways the independent study program might create learning opportunities that connect students to individual areas of interest.

The CFI-Fitness Center project will also include researching local, national and global societal issues around health, nutrition and physical activity. Scarsdale High School students and teachers will begin the design and implementation of community based workshops and

seminars, in addition to developing community outreach opportunities in these areas.

Facility Design and Layout Components

In an attempt to offer a holistic approach to wellness, the following rationale was used in the design of the six distinct components of a proposed Scarsdale High School Health, Fitness and Learning Center. While there are no specific plans to construct a facility at the time of this publication, our team is hopeful that the concepts presented will inform the design of a future space at Scarsdale High School.

1) Classroom/Exercise Science Lab

The Lab would be designed to be the most flexible space in the facility. This space can be easily set up for a multitude of activities including exercise science labs, class lecture, video and movement analysis, community outreach programs, yoga lessons, aerobics, core training, stretching area and more.

The Lab would be supported by technology common to a classroom such as a computer, Internet connectivity, smartboard, video monitoring device, audio system and a dry erase board.

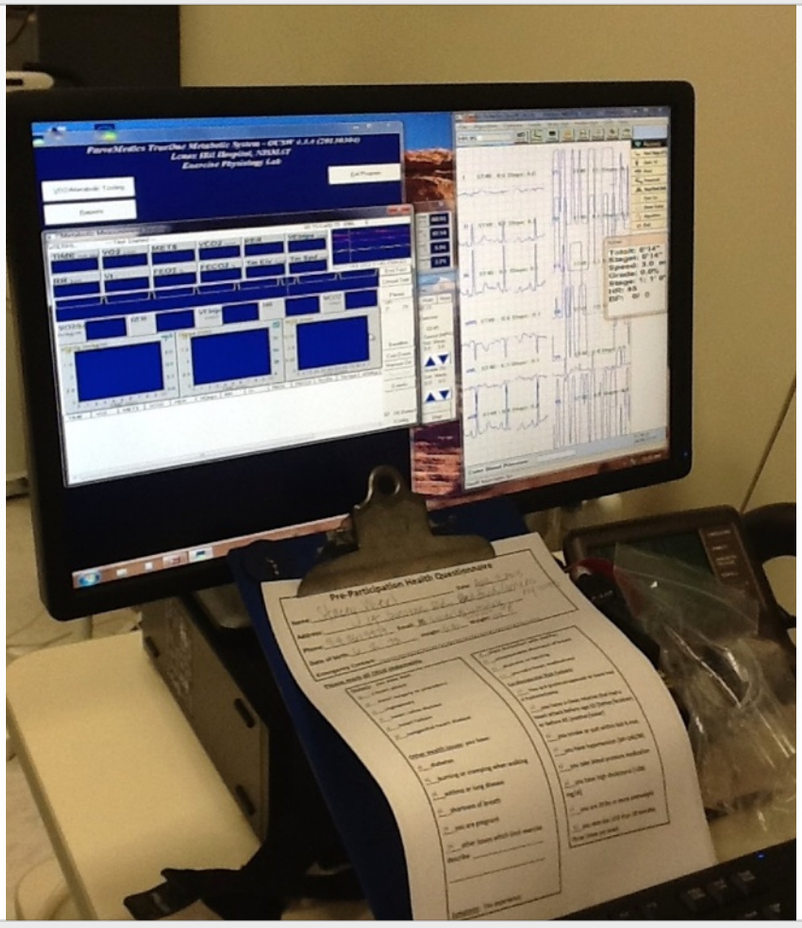
MOVIE 9.1 Measuring body systems

A grant team member experiences high tech body monitoring during a site visit.

2) Cardiovascular Training Area

The Cardiovascular Training Area would be outfitted with a variety of equipment supported with the latest technology that will enhance the user's interaction. Internet connectivity, as well as the use of USB drives, would allow the user to create and track personalized workouts as well as access interactive courses.

INTERACTIVE 9.1 Exercise Physiology Lab Technology



3) Selectorized Plate Training Area

This section would be comprised of a variety of resistance training equipment targeting all of the primary and secondary muscle groups of the body. This equipment is ideal for the novice user as it allows them to focus on the movement of weight without having to worry about balance and spotting. The selectorized plate machines also play an important role in supplementing the more advanced user's training.

4) Free Weight Training and Power Rack Area

The Free Weight Training area would feature multifunctional racks that will serve as the primary area of focus for more than one user. Each rack is designed to provide 2-3 training stations for 6-8 users. Equipped with a multitude of accessories, including an adjustable bench, these stations will allow the user to train functionally and safely in many different ways.

5) Small and Light Weight Training Area

The novice, intermediate and advanced user would benefit from the small and lightweight training area. With weights ranging from 5 pounds to 100 plus pounds the use of dumbbells would provide all users with the opportunity to train with a greater range of motion that is more functional than a barbell or a fixed machine. Dumbbells can be used to supplement other areas of the facility, or stand alone as a great resistance-training tool. They also allow for quick changes of weight, which support training methods such as supersetting and circuit training. Additional characteristics of this area include adjustable benches and open areas for standing lifts.

6) Multi-Functional Training Surface

The Multi-Functional Training Surface is an artificial turf runway approximately 20 yards in length and 6-8 feet in width. The purpose of this training area is to provide a space where dynamic warm-ups and a variety of skill work can be done. When this area is not being used for skill work or warm-ups, transportable equipment can be placed on it. The area can then support group activities like spinning, rowing, slide boards, agilities, plyometrics, jump training and stretching.

The Future

While there is currently no plan to build our proposed Center for Fitness and Wellness, we hope that our work will influence PE curriculum design. We also hope that Scarsdale High School will someday contain a facility based on our team's plan. We would like the thank the Center for Innovation for allowing us to re-imagine teaching and learning in the High School Physical Education curriculum.

Project Team

Kevin Blake, George Blessing, Jodi Giroux, Devin Hoover, Jessica Levenberg, Jeremy Szerlip, Stacey Suffridge Wierl

Chapter 10

High School Interdisciplinary Innovation Spaces

Through the process and meetings with the various constituencies, we have created strategies for integrating innovation education into the High School faculty's practice.

Our team began by focusing on the physical space in the high school that was to potentially be renovated into a Center for Innovation, as well as on programs in schools that facilitate innovation. While participating in Building Committee meetings, our team researched innovation spaces both in schools and businesses. We read many books, visited sites, and interviewed people about these spaces as well as innovation education, which led to our identifying a set of innovation skills and attributes useful for life in the 21st century.

At the same time, we began to reach out to others with similar interests and formed a network of like-minded individuals who were involved with innovation education. This group became our Advisory Board, http://innovatescarsdale.com/about/, as well as serving as our mentors along the way. We created a Steering Committee made up of a group of leaders representing students, teachers, parents, and administrators. These can be found on our website: http://innovatescarsdale.com/steering-committee/

We visited the Center for Architecture to view their exhibition on innovative school design and traveled to Westport, Connecticut to view the Makerspace in the public library. During both site visits, we spoke at length with individuals leading our tours.

In January, it became clear that the physical renovation was going to be farther in the future than we first believed, so we turned our focus to program and curriculum changes that would further innovation skills and attributes. We invited High School faculty to a meeting to present some of our findings and discuss how we could work towards changing curriculum to further facilitate these skills and attributes in our students. While faculty was interested, the perception was that the potential building changes were driving our work. We spent a great deal of time at the meeting correcting this misperception. We held an initial meeting with parents and the high school PTA and found similar misperceptions among this group. We also met regularly with Ken Bonamo and Chris Renino to keep them apprised of our work.

At this point, we brought in Co Barry, an Innovation Education consultant, a former lecturer at HassoPlatner Institute of Design at Stanford (also known a as the "D-School") and the director of KDT, a consulting firm specializing in helping educators encourage creativity, to spend a day at SHS meeting with interested teachers, parents, administrators and students. She ran a "Design Thinking" workshop to demonstrate the process used by the Stanford D-School. Discussions with parents focused on why their children need to learn differently in order to be prepared for the 21st century. Through her visit, we

INTERACTIVE 10.1 A Scarsdale team visits the Edgeless School exhibit at the Institute for Architecture in NYC.

redirected the focus of parents and teachers to curricular discussions.

We learned from our students who met with Co Barry, that many of them were already involved in innovative experiences both inside and outside of school. We decided to let the students' energy drive our initiative. As one of them stated: "Scarsdale teachers will do anything to help their students learn." Several students helped create and continue to manage our website: http://innovatescarsdale.com. Gabrielle Santo-Donato, "Curiosity Director" at The Future Project, http://www.thefutureproject.org, who has visited us several times for meetings with students, has been advising our students on the management of the website.

Maggie and Lisa met with Juliette LaMontagne, http://fellows.ted.com/profiles/juliette-lamontagne and Gabrielle Santo-Donato, over spring break and brought along one of our interested students, Brett Pogostin. This brainstorming session was invaluable and resulted in the reaching out to more of our community through student and parent meetings.

We held a Student Caucus, inviting students with whom we had connections and asking them to reach out to other like-minded peers. On April 18th, we had over 20 students and a few faculty "witnesses" in one room to discuss what students felt had been authentic learning experiences both inside and outside of school, and to brainstorm ways to support more of these experiences. A video of that meeting is included in our journal entry.

On May 20th, we convened a group of twenty-interested faculty who were invited to attend because their students mentioned the authentic learning experiences they had had in their classrooms. First, the faculty at the high school observed that there are boundaries. We must teach content

and material that will enable students to obtain high scores on standardized tests, and to continue to provide the strongest possible disciplinary foundations.

MOVIE 10.1 Lisa Yokana

Art teacher Lisa Yokana talks about the time commitment involved to work on this project.

The pressure to have students get into selective colleges is something that is understood by all faculty here. Parents are pleased with what we do, and some see no reason to change. We discussed establishing measurement indicators for important and needed skills such as self-motivation, empathy, creative confidence, and resilience. We began to identify and create exemplars of project or challenge-based learning experiences so that faculty and students can see the benefits of this type of teaching and learning. We also recognize that we need to educate some parents and realign their concept of "education," while relying on those community members and parents who are urging us to keep moving forward.

We held a Parent and Alumni Gathering on May 30th in room 170/172 which included a presentation by Juliette LaMontagne, expressing the need for innovation education and introducing us to the concept of an "Ecosystem Map" of possible mentors, experts, and support. We reached out through the PTA's, both high, middle and elementary school, to invite parents to learn more about the importance of Innovation Education and its role in their child's future success. Approximately 20 parents and half a dozen alumni attended the Gathering. A few current students attended as participants.

Here are a few existing examples of innovation education at the high school:

In the final two weeks of Food for Thought, Rashid Silvera's students examined a real-life problem: the food crisis in the high school. If lunchtime is overcrowded now, how would 80-100 more freshmen be accommodated next year? What solutions could students propose that would alleviate the problem? Students formed groups to examine different aspects of the problem. See the video for one group's take on

the value of this type of experience and what they learned. To guide their process of discovery, they used the Design Thinking process. You can view this group's blog at http://cafeteriadesign.tumblr.com/ To see the other group's blogs, go to Silvera's high school teacher page and look at the blog page to find links.

Last year, four students from Architecture and Environmental Studies worked together to design a green building that was completely off the grid. They worked with a local green builder, visited factories that produced solar panels, and found experts in the field for guidance. They also kept a blog of their experiences: http://bedfordgreendesign.blogspot.com/. One of these students is now studying green architecture, another is studying engineering, and a third is studying construction management in college. They talk about this experience as being the most valuable learning they did in high school. It allowed them to discover information they used to create a real house, which was something they were passionate and interested in learning about.

In Architecture II this spring, students were given the footprint of a townhouse and the minimum programmatic space requirements: a 12' x 12' bedroom for example. Given this real-world design challenge, students have created different design solutions and their models in ¼ scale. See our Website, http://innovatescarsdale.com/exemplars/.

Maggie Favretti's curriculum and assessments also include changes which resulted from the grant research:

In 9th grade an art teacher revised the Ibn Battuta projec,t making the essential question more open-ended. Under what circumstances did Ibn Battuta (and travelers in general) learn best? Marketplace booths were similarly open-ended. Instead of telling students how to represent their region/section of Ibn Battuta's travels, the art teacher asked students to collaboratively solve this problem: *How are you going to show both what he saw/learned and demonstrate how you can learn best about other cultures?*

Also in 9th grade, the art teacher revised the research DBQ on the Crusades and the combination of Church and State today, to be more open-ended. The question is now: *Does the combination of Church and State result in positive or negative outcomes?* Students have to use research on contemporary issues and the Crusades to either: write a concession/assertion essay answering the question, or write a thesis and demonstrate it through other symbolic representation, such as music, dance, poetry, plays, etc. The latter option must be accompanied by an explanation of the meaning of symbols and decisions made. Both options must be accompanied by a self-generated rubric showing the

importance of certain characteristics, and demonstrating reflection about the most important aspects of the students' work.

In 11th grade: Students did an extensive research paper on a topic of their choice. In AT it was free-er; in AmStu it had to include a book from a list of post-war greats. In AT, since they did it in the third quarter, they were given the option of doing a "creative extension," which in our case includes a documentary about student life in Scarsdale, a policy paper, short stories, music, and film. Students have been encouraged to seek publication, to contact policy makers, and to collaborate with experts in the field. Some students used creative expression instead of the formal research paper, but had to accompany it with thesis and context, as well as detailed explanation of choices made.

The new interdisciplinary course combining Food Policy and Nutrition Science, will be problem-based.

We have more exemplars in the works for next year, including several students who are interested in doing independent studies beginning in the first part of senior year, which will be developed into authentic, problem-based Senior Options.

Maggie, Lisa and Howard Rodstein will participate in a professional development "ride-along" experience with Project Breaker this summer. Breaker is the work of TED Senior Fellow, Juliette LaMontagne. Through the Design Thinking model, young adults examine a real-world issue and propose solutions. See Breaker's website for further explanation: http://www.projectbreaker.org/. She has agreed to make an exception for one of our students who will be part of the Breaker team in New York City and for two who will be participating online. Through this professional development, we hope to gain more knowledge of Design Thinking and ways to guide and implement it here at SHS.

MOVIE 10.2 Lisa Yokana

Art teacher Lisa Yokana describes the potential impact of her team's project.

We have proposed an Scarsdale Teachers Institute course for the fall, which would bring our experience of Design Thinking and how it can be used to the K-12 faculty. This course would support teachers as they use Design Thinking in their own classrooms and help to increase the number of project-based learning activities.

In conclusion, this has been a valuable project in that it allowed us to research innovation education work in the field and right here at home. Through this process and meetings with the various constituencies, we have created strategies for integrating innovation education into the high school faculty's practice. Institutional change cannot and should not be made overnight, for many reasons. Students are enthusiastic about change, and teachers are, too, though they need time to understand the changes and embrace them in their own ways. We believe that we have made positive strides towards this change in the relatively small amount of time that we have been working.

Project Team

Lisa Yokana and Maggie Favretti

Innovation in Education:
A Brief Review of Leading Thinkers and Theories

Book Reviews

Zig Zag: The Surprising Path to Greater Creativity, Keith Sawyer. Jossey-Bass, 2013.

Creative Intelligence: Harnessing the Power to Create, Connect, and Inspire, Bruce Nussbaum. Harper Business 2013.

Creating Innovators: The Making of Young People Who Will Change the World, Tony Wagner. Scribner, 2012.

Until now, Keith Sawyer has been, perhaps, best known for his work on collaborative innovation, described in his 2007 book *Group Genius: The Creative Power of Collaboration*. In his new book ***Zig Zag: The Surprising Path to Greater Creativity,*** Sawyer presents a manual for developing individual creativity as a pathway toward successful innovation. He argues that we all have the capacity to become more creative, and that we have what it takes to innovate. What's needed for us to develop our creative capacity is deliberate practice through engaging in focused and purposeful creative thinking habits and exercises that can lead to innovation. Sawyer's book, which aims to serve as coach and personal trainer for individual readers, is grounded in eight practices he has researched over a twenty-year career as teacher, consultant, and creativity guru.

Sawyer's 8-fold path to creativity includes the following steps:

1. Ask. Creative work is grounded in clear and meaningful questions.

2. Learn. Continued, life-long learning is essential for developing the habit of creativity—learning anywhere at any time.

3. Look. Seeking new experiences, and cultivating mindful awareness is essential for seeing the surprising and discovering the unexpected.

4. Play. The creative life is filled with play, with time for unstructured activity pursued out of pure interest and with sheer joy.

5. Think. Creativity derives from having lots of ideas, many ineffectual ideas that can be discarded, and occasional gems to polish and process.

6. Fuse. Making connections, putting things together in unusual combinations is essential for creative thinking.

7. Choose. Creativity and innovation require the ability to select productive idea possibilities, to evaluate ideas with appropriate and effective critical criteria.

8. Make. It's not enough just to "have" ideas; we need to make something of them. Making is essential; producing, developing a product—a drawing, draft, model, prototype—a

discrete, concrete something, and not simply a good idea that is only talked about.

Sawyer lays out a set of exercises and practices with specific techniques that enable us to become more creative. He argues that it's not enough simply to read about creativity. We have to work at it; we have to practice the skills associated with developing our creative thinking. And in Zig Zag, Sawyer provides more than one hundred specific suggestions for engaging in productive creative practices.

A final point: Sawyer notes that we don't develop our creative capacities in a linear fashion—by simply following through on his eight steps one at a time, one after the other. Rather, we zig and zag among them, starting anywhere, and doubling back recursively, as we apply the strategies and techniques associated with his eight steps as many times as necessary.

Sawyer's book is filled with examples, maxims, inspiring stories, and entertaining vignettes. It's worth seeking out Zig Zag, reading it, pondering it, and putting into practice its many useful suggestions—in zig-zag fashion, of course.

In ***Creative Intelligence: Harnessing the Power to Create, Connect, and Inspire,*** a useful companion to Sawyer's book, Bruce Nussbaum explains why we need to develop our creative thinking capacities. He cites the simple fact that the world is altering with increasingly accelerating speed, creating an environment that has been described with the acronym VUCA, which stands for "volatility, uncertainty, complexity, and ambiguity." Originating in the US Army War College in the late nineties, VUCA captures the prevailing instability of not just the ever-changing environment faced by the military, but of the everyday world we all inhabit.

To be able to confront the unpredictable and the unexpected, Nussbaum identifies five key competencies that businesses need to transform themselves, and that the rest of us can use to adapt successively to rapidly changing circumstances.

1. Knowledge Mining. This requires collecting and connecting information from varied sources across disparate disciplines. Knowledge mining includes reaching into our own knowledge storehouse, tapping into the knowledge of others, and doing research to meet new challenges.

2. Framing. A frame of reference is essential for seeing how each of us sees the world in comparison to the frames of reference others inevitably use. Framing involves learning to shift perspectives, to see from others' points of view, and to consider how bias may limit our ability to become more creative thinkers.

3. Playing. We need to give ourselves permission to play, to explore, and to entertain unusual ideas, all without necessarily having a clear-cut goal or direction for our thinking. This involves more than simply playing games and engaging in free-play; it also requires that we design our own games and direct our own types and modes of play.

4. Making. It's not enough, says Nussbaum, to play, to learn, and to frame; we also need to create something, to

make things for ourselves and for others. Making our own holiday cards, for example; making drawings; creating models and drafts, prototypes and preliminary versions. We need to construct these with our own hands and minds.

5. Pivoting. Pivoting involves both taking an idea and making it a reality—applying it in such a way to make the idea a working product or practice. It also requires shifting gears in the midst of a project, revising the project by taking it in new and more promising directions.

Like Sawyer in Zig Zag, Nussbaum offers many specific examples of his five key competencies. He illustrates them with stories from a wide range of varied companies' products and services, and he provides nuggets of wisdom and inspiration to encourage readers in their pursuit of a deepened and expanded creative intelligence.

A book on innovation more directly and immediately linked with education is ***Creating Innovators: The Making of Young People Who Will Change the World,*** in which Harvard educator and international consultant Tony Wagner argues that innovators can be cultivated and fostered in both families and schools. Wagner believes that innovation involves both nature and nurture—that it requires a certain amount of inborn talent to be sure, but that it also is developed through a set of conditions and opportunities. He identifies three critical factors for developing innovative thinkers: play, passion, and purpose.

Play is important from an early age—free and open play that allows for imaginative thinking. Playing with simple toys and even with objects adapted as toys (toys invented and improvised on the fly) allows children to develop their imaginative capacities. Wagner argues that play should be unconstrained, and that there should be ample opportunity for freedom to explore, imagine, and invent.

Passion is critical for innovative thinking to develop. When we are passionate about something—playing soccer or the piano, surfing waves or websites, learning a language, cooking inventive meals—we devote ourselves to it. We don't think about or fret over the time we commit to it, or the challenges we confront in the process of doing it. We love what we are doing so much that we become caught up, lost in the flow of the experience. Passion keeps us going when others who lack that passion would quit.

A third aspect—purpose—is necessary for the long haul. Without a sense of purpose and meaning, without a sense that what we are doing has real value, we would have little incentive to carry on for long stretches and through arduous challenges. Having a purpose for what we are passionate about gives it meaning, makes it matter to us and to others. Purpose serves as sustaining motivation.

Tony Wagner also suggests that for innovative thinking to develop there must be an emphasis on doing and not just on knowing. Knowing that and knowing why are, of course, important. But for innovation to occur there needs to be a

more active element—the conversion of knowing to doing, the application of knowledge in a process of action. Wagner posits a set of six criteria essential for developing innovative thinkers. He highlights the significance of these criteria by contrasting them with six opposing characteristics. Wagner identifies the following set of contrastive productive and destructive qualities linked with nurturing (or preventing) innovative thinking. The first term of each pair fosters innovation; the second term inhibits it.

(1) Collaboration vs. Individual Achievement

(2) Multidisciplinary Learning vs. Specialization

(3) Trial and Error vs. Risk Avoidance

(4) Creating vs. Consuming

(5) Intrinsic vs. Extrinsic Motivation

(6) Liberal Arts vs. STEM subjects (science, technology, engineering, mathematics)

One important qualification should be made regarding the last item—liberal arts vs. STEM subjects. Wagner values BOTH scientific subjects and thinking AND humanities subjects and humanistic thinking. He argues that innovation occurs when individuals are able to combine the varied approaches, aspects of thinking, and ways of doing, ACROSS the sciences / humanities divide. One recent spectacular example is Steve Jobs, whose interest in things technical and computer-related meshed and merged with his intense interest in arts and humanities. Jobs added a genuine concern for how people would use the products he and his teams developed. He had a passion for making his products beautiful as well as functional. For Jobs aesthetics embodies ideas; form inhabits function—elegantly, gracefully, imaginatively.

One cautionary note about Wagner's book is that each of the splendid examples of innovative practice he describes, including the MIT Media Lab and the creativity institutes he researches and celebrates, typically exists on the margins of their respective educational universes. The wide-ranging thinkers Wagner interviews, though employed by prestigious institutions, typically are neither tenured professors, nor department leaders, nor yet influential change-makers. Instead, these creative and visionary individuals head institutes, direct think tanks, and otherwise exist on the periphery of the institutions of which they are a part. With time, one hopes that what is now peripheral in terms of creative thinking and innovative practice in these places will find its way to the center and to the sources of power, prestige, and influence.

Robert DiYanni, Director of Arts and Aesthetic Education for the Scarsdale Schools and a professor of humanities at New York University, is the author of The Pearson Guide to Critical and Creative Thinking.

The Future

We imagine that the Scarsdale Center for Innovation will serve as a model for other schools who wish to engage their faculty and community in a conversation about the future of education.

This year, the Center's leadership plans to:

- Continue to invite outside experts to talk to Scarsdale teachers about the importance of innovation and entrepreneurship
- Develop promising projects that were funded in the first round of grant proposals
- Partner with schools and other organizations who are interested in educational innovation

Lynne Shain, Co-Director of the Center for Innovation, presents an overview of the Center's activities at the Consortium for School Networking's Annual Conference.

- Present our story at local and national conferences

For more information about the Scarsdale Center for Innovation, contact:

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News about the Center for Innovation's activities can be found at the CFI Website:

http://www.scarsdaleschools.org/innovation