DESIGN CURRICULUM TO CREATE LEADERSHIP

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In 2013, the School Reform Commission of the Philadelphia School District made major budget cuts to its public school funding for the 2013-2014 academic year. It planned to lay off 3,800 employees, removing arts programs and school nurses, and proposed closing 27 of the 241 public schools in the city (Iaboni, 2013). During the time of school closing proposals, Dimner Beeber Middle School in West Philadelphia was intended to be placed on that list. The decision was made to keep the school open when the Science Leadership Academy, a magnet school in Center City Philadelphia, offered to start a new campus in the unused third floor of the building (Giebel, 2013). Before the 2013-2014 academic year began, the Philadelphia school district superintendent, Dr. William Hite, asked the city for $50 million in order to make sure the schools were able to run sufficiently. Despite this bleak economic situation, the Science Leadership Academy successfully opened a new branch of its high school. The Science Leadership Academy, also known as SLA, is filled with students from around the city who applied because of the school's well known reputation of a college preparatory curriculum and its focus on science, technology, mathematics, and entrepreneurship. The staff had less than a month to pull together resources to make the physical space appropriate and usable. They removed the rusted metal grates that covered the windows, fixed the crumbling walls, added fresh, bright paint to the lockers and classrooms, and put in new, clean glass, resulting in vast improvements to create a positive learning environment. To continue their efforts and to provide the school with resources it did not have left in its budget, a design curriculum was created to lead 9th grade students through the process of making classroom furniture for their peers.

A NEW SCHOOL PEDAGOGY

The Science Leadership Academy is a unique school model that runs on the belief that students benefit most when they learn and work collaboratively, with a strong focus on exploration and project-based learning. The school's core values are inquiry, which they believe is the first step in the process of learning, then research, collaboration, presentation and reflection, which are highlighted in their curriculum. SLA also runs on the belief that their school should shadow the following principles: learn, create, lead (Science Leadership Academy @ Beeber, n.d.). Because of this student-led class style, the school requires unique classroom furniture. After observational research, the design leader had a discussion with the program coordinator, David Sokoloff, where he explained the unique pedagogy and the connection with the physical classroom environment. "There isn't necessarily a 'front' of the classroom", he said. The students arrange themselves into groups for their collaborative project learning curriculum. While the teachers do lead class, the sessions don't require the students to face a blackboard and listen to a lecture for the entire period. Both the students' and teachers' needs are based around movement in the classroom, to support collaboration, while still needing individual time and space. The classrooms in SLA vary. Many are a collage of wobbly tables and mix-matched chairs or old traditional desk-chair combinations pushed together to create community environments. Sokoloff informed the design leader that the furniture was all handed down or gathered from closed schools. They currently don't have the funds to purchase furniture that is specific to their academic needs.

"MINI-COURSES"

In addition to the unique learning environment and pedagogy, the school offers an explorative program to its 9th grade students. In the form of 90 minute sessions, once a week, for 8 weeks, the school brings in outside professionals to lead "mini-courses." These "mini-courses" happen 4 times a year, and along with the particular core values and teaching style, an opportunity arose for the creation of a design project

focused on empowerment and community engagement through design. The ID for Early High School project is focused on designing and leading a curriculum for 9th grade students to move through the design process. This first group's project is to design classroom furniture for their school, meeting their teachers' and classmates' unique needs. The project is composed of 5 "mini-course" sessions, with approximately 10 students. Each session focuses on an aspect of the design process, delivered through collaboratively developed techniques, focusing on the industrial design fundamentals. The students in each "mini-course" are subject to change; while some students may choose to follow the project all the way through. Because of this turnover, the curriculum is built to allow one group to finish and document their progress with the project at a suitable end point. This document then gets passed onto the next group, who will pick up where the project left off. Consequently, separating the process allows the students to focus on each particular aspect of the design process and understand the value it has. Additionally, this focus will create ownership of that work and the students gain pride in having done that part for the overall group. Other expected products of this curriculum design are to create a sense of responsibility for the students as they are the ones gathering the research and leadership as they are creating concepts and making decision for their teachers and peers. Also, they are expected to gain the ability to accept and process constructive criticism, focusing on the quality of the various aspects of the design. Along with these personal development outcomes, the curriculum adds to and endorses the core values of the Science Leadership Academy. The skill-building and design process curriculum can allow the students to serve themselves in ways the school district is not able to right now. Overall, the curriculum can empower the students by giving them the tools to feel able to use the design process to successfully address other problems in their community.

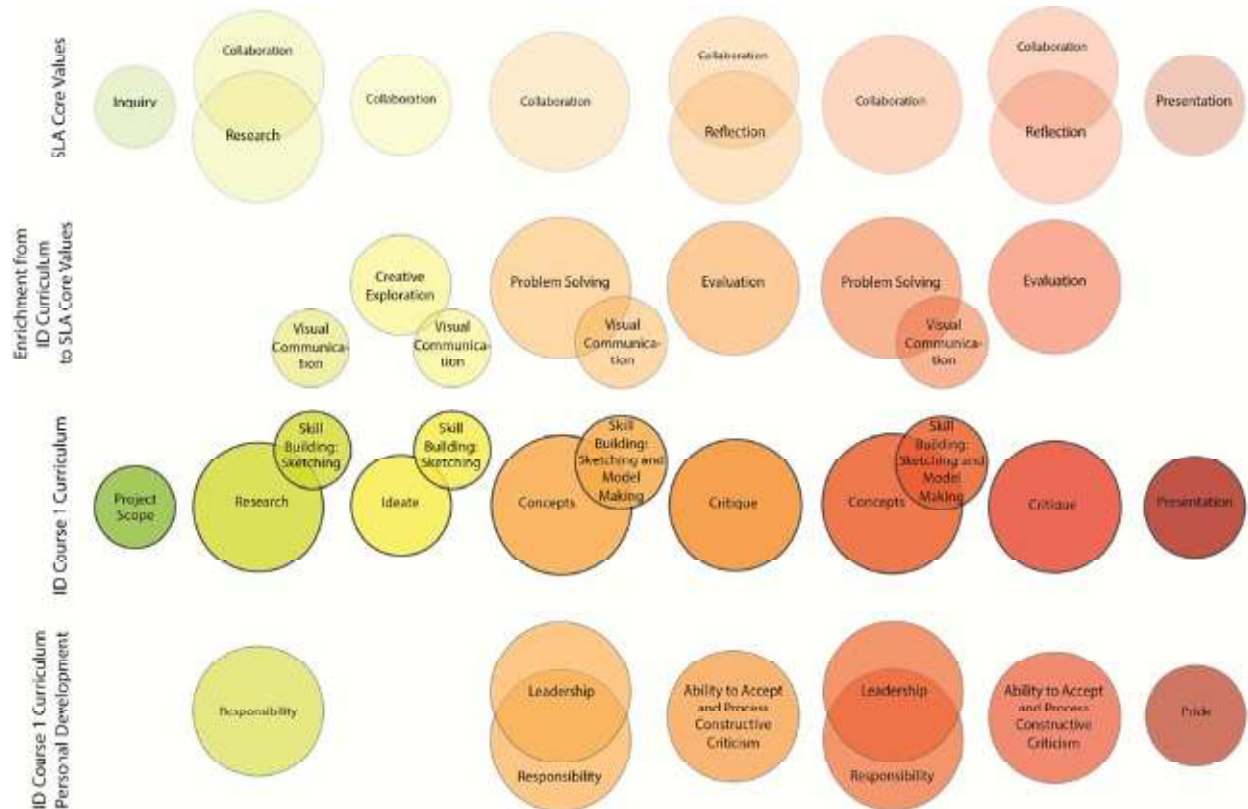**"MINI-COURSE" 1 CURRICULUM AND HOW IT COMPARES TO SLA'S CORE VALUES**

Figure 1: The graphic above shows how the ID for Early High School curriculum aligns with the core values of the Science Leadership Academy, how and where the curriculum adds important values to the existing core, and where the students are growing personally.

THE 5 COURSE PLAN FOR LESSONS

	Course 1: Research and Concepts	Course 2: Model Making and Design for Fabrication	Course 3: Testing and Materials	Course 4: Finishing Concept	Course 5: Production
Lessons	Introduce Industrial Design Present Project Layout Design Research Methods	Introduce Industrial Design Concept Review	Introduce Industrial Design and Desk Models Discuss Strengths and Weaknesses	Review of Desk Models Critique Sketching	Introduce Design, Materials, Production Finishing
	Collaboratively Plan Research	Sketching Critique Concepts of Course 1	Sketching Testing Models Discuss Criteria to Evaluate	Evaluate Desks Choose Desk Design Select Details to Perfect	Sketching Review Building and Finishing Process
	Review Research List Project Criteria Based on Research	Edit Concepts with Sketching and Model Making	Sketching Discuss Materials with Engineer Teacher	Sketching Edit Design of Chosen Desk	Assemble Desks Finishing
	Sketching and Brainstorming	Critique New Concepts	Model Making, CAD Discuss Sustainability with Environmental Science Teacher	Orthographic Drawing Digital Design Layout Prep for CNC	Assemble Desks Finishing
	Review Brainstorming Ideas Sketching Concepts in Foam Core	Select 2 Concepts Sketching Importance of Fabrication Planning	Refine Models Decide on Materials	Assemble Desk	Assemble Desks Finishing
	Concepts in Foam Critique	Decide Dimensions Orthographic Drawing, Digital Drawing and CAD	Digital Design Layout Preparation for CNC	Discussion about Finishing Techniques	Assemble Desks Finishing
	Improve Concepts Based on Critique Prepare Materials to Pass On Descriptive Concept Drawings	3D Print Models Assemble Critique	CNC Assemble Desks Evaluate	Finish Desk	Wrap-Up Documentation
	Present Work Final Critique Reflect	Drawings of Visual Instruction of Assembly	Critique	Final Critique Document Process	Final Critique Present to School

Figure 2: The graphic above shows the lessons for each "mini-course".

OBSERVATIONS THUS FAR

At the beginning of the project, most of the students do not know about the scope of industrial design. In the first session, the students fill with excitement when they see how industrial design includes the way they interact with their phones and envision futuristic transportation, as well as experience with the furniture in their school that they have so many complaints about. One student eagerly expresses interest in architecture, asking where the line is between architecture, furniture design, and industrial design. After presenting the project of designing new furniture for their school, along with the description that in the first few sessions they could propose a vast amount of wild ideas, the students begin to share a sense of responsibility. They receive encouragement from their teachers to take action on what they want to improve in their learning environment. This is followed by one student pumping up the group to get them excited about the possibility of designing school t-shirts or painting the rooms a different color. They all share wild ideas and take turns bringing each other back to the scope of the project, leaving room for exploration in the realm of classroom furniture. Throughout the project thus far, the students have maintained enthusiasm and responsibility for the possible end product, but have needed guidance in staying focused and in moving throughout the process. A design leader is needed for this ID for Early High School curriculum, to advocate for the process and steer the design students in the direction of practicality, timing, and feasibility.

PLANS FOR FUTURE "MINI-COURSES"

Based on the observations of the class up until session 5 of "mini-course" 1, the students need more concentrated activities. As they finish their first attempt at creating concepts in foam, the design leader leads them rapidly through concept creation: building projects in foam, then moves quickly to sketching on paper, and then to another method. The times when the students lose focus is when too much time is being spent on one activity. However, the students are leading themselves along this project. When a few students come up with wild ideas, as suggested, others pull out the aspects of the idea that they see would best serve their teachers and peers. As they began to understand what kind of research is needed for the project, the students share their critiques of their school's current furniture and assign themselves areas to focus in on. They encourage each other as they figure out the best way to gather the information, whether it is to take measurements of their peers in their desks, interview teachers, or observe classroom behavior.

While the students are comfortable in research and building, they are nervous when it comes to sketching. They are getting introductory drawing lessons in art class, but about half of the students are really shy when asked to express something visually. Specific drawing exercises are implemented halfway through the first "mini-course" and help the students feel more comfortable sketching. In the future of the curriculum, these exercises will be implemented at the beginning of each "mini-course" as they are needed for visual communication in each: Model Making and Design for Fabrication, Testing and Materials, Finishing Details, and Production.

After the students finish a "mini-course", the design leader expects noticeable change in their academic and social attitude throughout the course of their high school career. It is expected, and the school can observe, that the students are more motivated and involved in other school community projects and show a positive shift in their attitude towards the school body and physical space. Additionally, the design leader expects these students to apply their new understanding of design process and skills in future class projects.

RELATED PROJECTS AND HOW <u>ID FOR EARLY HIGH SCHOOL</u> DIFFERS

Through this design curriculum, the students increase in confidence and excitement as they become leaders in their school. This project scope and curriculum were inspired by Emily Pilloton and the work that she does with students through Project H Design. It shares similarities; the students learn the design process and related skills while becoming leaders as they design and build something for their community. Additionally, Project H and <u>ID for Early High School</u> are both being used as a way to enrich public education and the learning environment, giving young people the tools they need to make a positive impact and build greater citizenship (Project H, n.d.).

However, the <u>ID for Early High School</u> curriculum brings high school-aged design curriculum to a different place. As it breaks up the design process to fit into this "mini-course" framework, it offers a design education and leadership project in a modular delivery system. Project H requires a cohort of students that are evaluated throughout the entire process. While this project is on a specific timeline, passing the project along to other students enriches the student experience. It drives them to focus on their one area and to understand the depth and importance of that part of the design process. Additionally, as they feel proud of their progress, the students also have to pass this information on to the next group of students for the project to be successful. To do this, they need to fully understand what they've acquired and created and how to present that with both visual and written clarity. The focused approach shows the importance of their area of study, and the passed down document shows the other groups of students the value of that area.

AUDIENCE AND IMPORTANCE OF CURRICULUM

This curriculum is designed for 9th grade students, at approximately 15 years of age; this first group was born around the year 1999. These students have grown up with fast and immediate, fantasy-like technology. In a study done in 2009, the students born in 2000 did not recognize the sounds of dial up internet. They used their first computer during their toddler years, receiving personal iPods or playing games on their home computers (Byhoff, 2009). This group has generally been defined as the iGeneration, playing off of the technology they are growing up with: iPhone, Wii; and for the individualized way these technologies are used. Additionally, while still in adolescence, they are consuming massive amounts of media on a daily basis and are labeled as having a constant need to be connected and to multi task (Jayson, 2010). Perhaps it's time for education to change for this generation. The <u>ID for Early High School</u> curriculum enriches the students' education as it leads them to communicate in a new way, through sketching, model making, and technical drawings. It has them collect information for research by observing and interacting with people, not by searching the web. The students are problem solving in the built environment and are part of a fabrication process. Through this they see that the immediate satisfaction of "stuff" comes from hard work and efficient planning. They do all of this while working collaboratively with their peers, having face to face interaction. Ultimately, the students gain an understanding of the design process and how it can apply to other aspects of their life. The curriculum creates an opportunity for the students to produce something with tangible results at the end of each "mini-course" and at the end of the project.
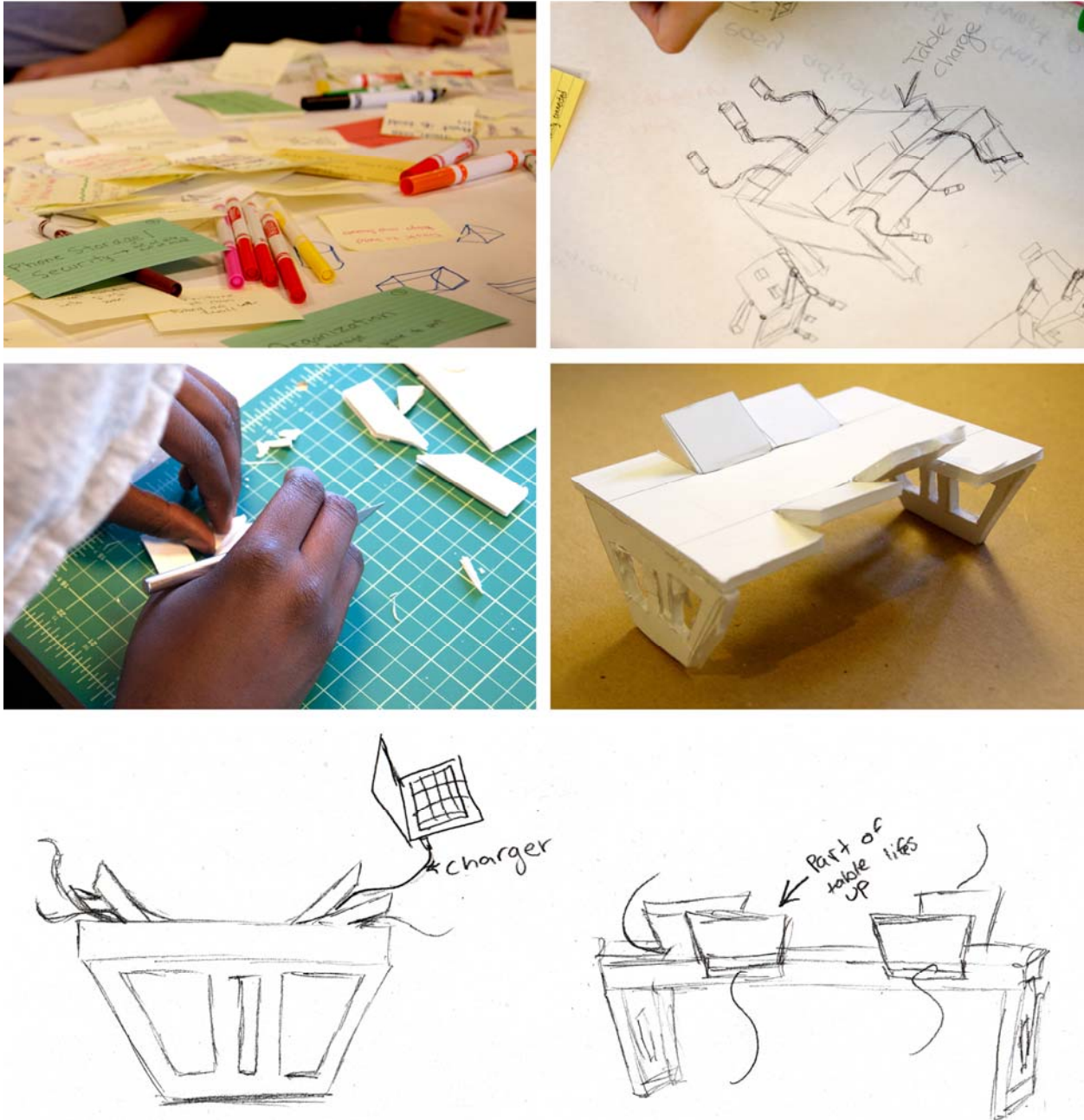
Figure 3: The images above show one student's design progression through the first "mini-course".

GREATER OPPORTUNITY TO IMPACT 9TH GRADE STUDENTS

Furthermore, the 9th grade year is crucial in ensuring that students stay on track to graduate high school on time. Studies show that 9th grade is a vulnerable year, saying that this year determines when most students will drop out. A study published in *Education* says that students in the 9th grade have more absences, failing grades, poor behavior occurrences, and lower grade point averages than any other high school grade level. The director of the Center for Promise at Tufts University, Jon Zaff, says, "Its a time

when the cognitive, emotional, and physical are all coming together. The schools are more likely new environments, and the students have more autonomy and more homework" (Willens, 2013). A Philadelphia study done by the citywide anti-dropout campaign Project U-Turn shows that in District 9 in 2011-2012, about one-third of the students in 9th grade were "off-track", having at least one of the following: failed grade in English or math, earned less than five credits, or had an attendance record of less than 70 percent, which can be a road block to make it to graduation on time. This puts these students at a higher risk of dropping out of school (Jablow, 2013). So, while the ID for Early High School curriculum is developed in a college preparatory school environment, it has the potential to serve a very important high school need.

With a curriculum that is based around a segmented design process, this project can be integrated into an afterschool club or other type of extra-curricular session. In other public schools, where an opportunity for a "mini-course" during the class day and required attendance don't exist, consistent attendance isn't a practical expectation. This curriculum model can be used by a designer to lead in a less structured environment. It allows the delivery of the material and movement through the project. For example, an underperforming high school that lost funding for art programs and requires a class day focused on English and math to bring up test scores, can use this model in an extra-curricular way. It has the potential to bring design education, and the associated personal development, to schools that don't have a method of delivering it to their students currently.

The ID for Early High School curriculum has the potential to help schools and students help themselves when it comes to making things for their unique needs or budget restrictions. While serving the physical needs of the school, it also offers a personal development aspect as it is able to change the students' mindset of how problems in their personal community are solved, shows the impact they can make through design, guides them to become leaders as they design for others, and teaches them to accept and process constructive criticism. As the students move through the process, they will be gaining skills that allow them to improve their visual communication, create physical "things" and to express themselves and their ideas with clarity. Lastly, this curriculum has the potential to motivate students to want to tackle other projects in their school or neighborhoods and the possibility to be integrated into a variety of school programs. This curriculum can guide any high school to build design leadership.

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