Rethinking Resources

A Guide to Incorporating Individual Capstone Projects in Public Urban Middle and High Schools

Lin Chen | Umang Desai | Anna Howard | Greg Levinsky

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Chapter I

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Chapter II

Theo Epstein: World's Greatest Leader?

A Successful Capstone Experience

In 1991, a student at Brookline High School asked his English teacher if he could submit a paper on minor-league baseball instead of the literary comparison that was typically assigned to the senior class. He pushed back against the teacher's initial refusal and went on to take the issue up with the department head and then the school's headmaster, finally receiving approval to turn his passion for the sport into a highly motivated research project. Fifteen years later, he discussed how the freedom he continued to enjoy through his undergraduate years at Yale "[allowed] [him] to write most of [his] papers on baseball, rock and roll – things that [he] wanted to write about" in an interview about his success as general manager of the Boston Red Sox. Theo Epstein, whose illustrious baseball management career has most recently led him to be voted Fortune Magazine's 2017 "World's Best Leader," is the perfect example of how students allowed to pursue their passion within their education can turn that opportunity into something incredible. The engagement that is fueled by the opportunity to complete a self-selected, self-driven project – in other words, a capstone - in the formative educational years can be a defining factor in the direction of students' lives. As an educator, bringing project-based learning into the classroom could mean changing the future, whether it's through World Series wins or community reform. This handbook is for educators who are considering taking that step, and aims to offer advice in minimizing

the barriers they might face in today's schools.

Chapter III

Background

The Current State of American Public Schools

III.1 The Purpose of Schooling

Many aspects of formal education have been heavily criticized. The purpose of schooling is one that has been critically debated by scholars. Undeniably, the purpose of formal education through schools is to prepare students for the future years to come. In 1916, American philosopher and psychologist, John Dewey, defined education "in its broadest sense, [as] the means of social continuity of life" (Dewey, 1). In his book, Democracy and Education, he used 'life' to denote the "whole range of experiences, both individual and racial … [and to] cover customs, institutions, beliefs, victories and defeats, recreations and occupations." Dewey explained that even our daily interactions with individuals or groups of different cultures and behaviors teach us, and these interactions are passed on to the future generations which helps in the societal education of the community. American education scholar Mike Rose, as well as Valerie Strauss, a reporter from the Washington Post who covers education, both believe that the traditional purpose of education in school was to be prepared for work, for life, and to be responsible citizens of the nation (Rose 27, Strauss). These purposes of schooling have been common knowledge for over one hundred years now. Just like Rose and Strauss, Dewey also agreed that "schools are [a] method of transmission of education" (Dewey, 2) to the members of their societies. It is evident that the purpose of schools goes above and beyond learning factual matter but also expands to the de-

velopment of oneself, interests, and learning the meaning of failure. Rose, Strauss and Dewey agree with numerous other scholars on the purpose of public schools: to "symbolize and shape knowledge and values" almost as if they are a "a sort of secular, social sacrament" (Paquette 2). Much of the literature on the purpose of public schooling aligns with the philosophy of believing that public schools have three main purposes: intellectual, civic, and moral development (Rose 28). Public schools are supposed to be a platform where students from all cultures, economic statuses, and interests can learn, from one another and from the educators of the institution, to develop their minds and learn how to balance their work, personal, and civic responsibility while also "reproduc[ing] the life of the group" (Dewey, 3).

The purpose of schooling has been agreed upon for over a century but yet, the focus of schools have shifted over time.

III.2 Why Are Schools the Way They Are: Standardized Monsters

The American government has long been involved in efforts to systematically improve the public school system, ostensibly with these goals in mind. In our country's recent history, the defining element of school reform has been the 2001 implementation of, and subsequent reforms of, the No Child Left Behind (NCLB) Act. This was the first major attempt to apply a nationally standardized set of expectations for schools, and it instigated a wave of education rhetoric around the gaps between the previously described purpose of schooling and the unsatisfactory results of the existing system. Notably, three years into NCLB's reign, the American Diploma Project (ADP) published their report "Ready or Not: Creating a High School Diploma That Counts," which in addition to detailing where contemporary schooling lacked, pushed for measures that would require "states to align high school standards, assessments and graduation requirements with the knowledge and skills necessary for postsecondary education and work" (American Diploma Project). This report fueled the development of 2009's Common Core standards, a highly prescriptive program for learning outcomes at each grade level.

Furthermore, these standards spread to 41 states thanks in large part to Obama's Race to the Top program requiring states to adopt similar standards to be eligible for funding. Common Core standards and the intensive, time-consuming standardized test-

ing they required were widely accepted. President of the National Education Association Lily Eskelsen Garcia described the resulting "system of test, blame, and punish" as "devastating for struggling schools in high-poverty areas...where teaching and learning were reduced to skills that can only be measured with multiple choice questions" (Garcia). Pushback against NCLB from educators and the community echoing this sentiment led to Obama signing the Every Student Succeeds Act (ESSA) in 2015, which returned control of how to deal with failing schools to the states, but still requires the same standardized assessments to be administered in order to evaluate schools and determine which are failing. These assessments have become the driving factor in how classroom time in the US is spent, especially in the underfunded urban schools serving marginalized families that the laws were designed to protect. Along with the trend of increasingly hypercompetitive college admissions process and the huge weight that this places on standardized tests such as the ACT or SAT, this aggregates to a school system that educates its students on how to take tests rather than on how to develop the skills they'll need in the real world once they leave the K-12 environment, whether going on to college or into the workforce.

III.3 Current Public Education Methods: Testing

Since fairly comparing innumerable students' academic proficiency is difficult when all come from different backgrounds, universities understandably utilize standardized testing to evaluate students on a level playing field. These standardized tests are in addition to the series of exams mandated by the No Child Left Behind Act (NCLB) that all high school students are required to take in school. Unfortunately, as students are overwhelmed with more and more exam requirements, there is reason to believe that the members of educational institutions are focusing classroom time on test-taking rather than the actual purpose of schooling – preparation for life.

Although, the American education system is clearly grappling with multiple challenges – current research identifies threats ranging from income disparities affecting educational outcomes and racist biases questioning intellect to inherent unfairness, standardized testing seems to bring about the outcomes most opposed to the actual purpose of schooling. Although the intended goal of standardized testing like the SATs and ACTs is to judge future academic performance on a level playing field, evidence suggests that standardized tests are failing to accomplish even this most basic task. Students are clearly expending excessive effort preparing for these tests, sacrificing time that could be spent

on more productive endeavors to chase an outcome whose purpose is largely in vain. The classroom is not immune to this either: whereas preparation for the SAT and ACT largely falls on the students' own time, preparation for NCLB-mandated exams primarily occurs in school. As a result, teachers are compelled to spend valuable class time "teaching to the test" at the expense of teaching the many untested subjects. Parents also expend numerous resources to help students score better.

Indeed test scores are important, but not so much that force students to forgo time spent on actual learning as opposed to learning to take the test. A an article written by Tamar Lewin, a national reporter for the New York Times – "A New SAT Aims to Realign with Schoolwork," discusses how students who plan to impress these admission officers spend too much time finding "test-taking tricks and strategies" (Lewin) rather than utilizing that time practicing "evidence based thinking" (Lewin). Lewin explains Mr. Coleman's – current president of the College Board – insight on how the current SAT forces students to waste time on finding "tips and tricks" for testing rather than optimizing their time by learning more important skills like critical thinking and reading that will help them better in college. Instead of focusing on improving their "important academic skills" (Lewin), students rely on "intense coaching and tutoring on how to take the test" (Lewin) to show their intellect. Not only do students sacrifice time spent on activities they like, but also this stunts the growth of their motivation for deeper learning as they only prepare for the purpose of scoring highly.

III.4 Education's Impact on New Employees

The logical follow up to education is employment, and it is imperative to discuss the relationship between today's standard-based education and employers. Modern day education is complex. The mainstream, contemporary goal of middle and upper-class schooling is for students to graduate with academic honors, attend a prestigious college and obtain the credentials necessary for a lucrative and successful professional career. In Chapter One of Why School by Mike Rose, he outlines the past ideals of education: intellectual, civic, and moral development. Now the focus is mostly economic (Rose, 2). Concerns over economics are certainly valid, but graduates unprepared for work will not help reverse economic issues. Moreover, the path students are expected to follow results in serving as "gatekeepers to post-secondary education, and as a consequence, professional membership" (Andrade et. al. 54). There is a presumption that more schooling leads to more money, and therefore professional success.

Figure III.1: There's a disconnect between what employers want and what schools are teaching, capstone projects can fix that

With the necessity of academic rigor and esteemed academic success, it appears that students are not quite as prepared for jobs as one would hope. Hart Research Associates compiled data from an online survey completed by 400 different employers regarding their employees' preparedness and their own sentiment towards project-based and applied learning.. Employers identified written and oral communication skills, teamwork skills, ethical decision-making, critical thinking, and the ability to apply knowledge in real-world settings as the most important learning outcomes for an incoming employee ("Falling"). The findings of the survey were disappointing for both students and employers. The employers feel that students are underprepared for real-world challenges. According to the researchers at Hart, "employers feel that today's college graduates are not particularly well prepared to achieve the learning outcomes that they view as important" ("Falling"). Rather, the learning outcomes desired by modern employers are not

taught in schools. The aforementioned skills discuss a wide range of abilities not necessarily demonstrated by strong performance on standardized aptitude tests or strictly memorization-based curriculums.

More importantly, recent graduates do not display the real-world problem solving skills necessary for success in the modern day workplace. Long-time postgraduate educator Wendy Hankle discusses a desire for an increase in range of skills in her 2009 article, "What Employers Want from Schools: The 'Consumer' Perspective." She quotes a variety of long-time employers discussing their new employees and changes in their respective fields (Hankle, 2009). Even in the STEM fields, Hankle quotes sources discussing the credentials of new employees, in that, employers felt credentials were not as important as well-rounded and multi-skilled employees who did not narrowly focus on their studies (Hankle, 2009). Having a variety of skills is more important than having an elite single trait or ability. Credentials are a start, but they do not carry weight if students cannot perform up to standards. Within the realm of education, students are not meeting the standards set by their employers. According to the study, merely 23 percent of employers say college graduates have the ability to apply knowledge in real world problem solving settings. Moreover, 44 percent of employers say recent college graduates do not have this skill at all ("Falling"). While students are getting the educational credentials needed, they are unable to perform the tasks most needed by their potential employers. There's a difference between book smarts and practicality, and the latter is lacking mightily.

Interestingly, employers stress the importance of project-based learning experience in recent college graduates that they hire. Nearly 90 percent of employers believe students should have engaged in a project-based "applied" learning project ("Falling"). They feel those who have participated in this form of work are the most hirable and ready for work. By participating in capstone projects during school, recent graduates will have utilized a variety of skills including teamwork. Work environments increasingly call for collaboration, and project-based learning serves as a precursor to real-world work environments.

III.5 Financial Difficulties Faced by Urban Schools

There has been a remarkable divide in school education between urban and suburban public education. Many factors play a part of it, for example, teaching

can be more challenging in a suburban, rather than, urban area. Many children living in urban areas come from underprivileged households. According to a study, 25% of urban school enrollments are made up of students from low-income family. These student who live in poverty may have small vocabularies, lower language skills, and higher dropout rates than children from middle-income families (Wright 2012). One major challenge faced by urban schools is the lack of funding and resources. Whereas suburban schools rely heavily on property taxes as their primary source of funding, urban schools' funding is decided by city governments. For the majority of public schools in the U.S., regardless suburban or urban locations, funding is a blend of federal, state, and local money. Local funding comes from property taxes, and federal money comes from the federal government, which usually aims at helping low-income students (Chingos and Blagg 2017). The state funding is calculated by funding formulas, where things get more complicated and confusing. The funding formula is different for each state or region. The funding gap, which is the amount of money spent per student in school districts, defined by Whitney Wright (2012), is growing between urban and suburban schools. It makes sense to take a closer look at the funding formula.

Exploring how schools are funded is the key to understanding their allocation of resources. For example, Massachusetts uses the Chapter 70 Formula to calculate the education funding for each district. According to the Massachusetts Budget and Policy Center, the state constitution requires that each district never falls below the bar of the foundation budget. This budget is "determined by multiplying the number of students at each grade level and demographic group (e.g., low-income and limited English proficiency students) by a set of education spending categories (e.g., teacher compensation, professional development, building maintenance), and then adding together those total dollar amounts"(Massachusetts Budget and Policy Center). The second step is to calculate the local contribution, which is determined by the amount of local tax revenue a district can raise. The Chapter 70 education aid steps in after, aiming at filling the gap between a district's required local contribution and its foundation budget. However, the required local contribution is only a minimum amount that a district must fund. Therefore many wealthier communities tend to contribute significantly more than the requirement (Massachusetts Budget and Policy Center 2010).

In many states, the funding formula used to determine the funding for each school district is heavily based on property tax, a method that leads to inequality. For example, in New York State, urban areas with high poverty rates like Syracuse and Buffalo, the property tax is perpetually low with the purpose of stimulating the economy. Many properties are tax-exempt because of their affiliation with churches and non-profit in-

stitutions, and the rest of the properties generate little funding and in turn, generate little funding from the state (Body 2018).

Moreover, the funding formula in many states is attendance-based, so the low attendance rate amongst students would reduce the funding the schools receive from the government. The urban public school enrollments are made up of more than 25% of students who are from low-income families. These students are likely to have higher rates of mobility, absenteeism, and poor health, which lead to low attendance rate in urban schools (Wright 2012). Furthermore, the education law assumes fewer students would receive special education than was the case at the time. The 2011 Cutting Class reports, "medical advances have dramatically increased survival rates of babies born prematurely, with many more surviving children growing up through the grades with severe disabilities." Additionally, some lower-income communities do not have the resources to spend above their required amount of local contribution. Hence, the schools do not have enough money to hire enough teachers or provide an adequate resource that students need.

Many state legislators in the U.S. are aware of the inequitable funding problem in urban public schools and are planning on redesigning the funding formulas to benefit students and the state. In 2017, Illinois state legislators approved a new funding formula that directs more resources to poor districts. Nevertheless, given the complexities of school finance systems, some people doubt that whether the new formula can succeed in building a more equitable education system (Camera 2017).

Chapter IV

Introduction to Capstone Projects and Project-Based Learning

IV.1 Defining Capstone Projects

Capstones are a form of project-based learning pedagogy. They usually require students to conduct research, work hand-on, and create something a physical item or a concrete or abstract idea. As defined by Buck Institute for Education, "project-based learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge." (BIE). Instead of using one of the aforementioned approaches which usually force the students to rote-learn or learn to test well, project based learning allows the students to formulate their question, create a hypothesis, test their hypothesis, and possibly, present their ideas to their community.

Individual capstones are one way to use this project-based learning pedagogy in a classroom setting. College Board's Advanced Placement (College Board) division has started it's own capstone courses where instead of "teaching subject-specific content, these courses develop students' skills in research, analysis, evidence-based arguments, collaboration, writing, and presenting" (College Board). Heather Ridge, an instructor at Otero Junior College in Colorado explains capstone projects to be "an opportunity for each individual student to pursue something they are interested in" which are in line with

their unique talents, imaginations, and hobbies (Ridge). Combining these two definitions, we can infer that capstones are a way for students to learn skills useful for work and personal life using a passion-project as a medium.

There are numerous types of individual capstones which allow flexibility with student interest, and resources available at the student's disposal. The College Board's AP course offers a two-class capstone course: AP Seminar and AP Research. In AP Seminar, students "complete a team project and an individual paper and presentation as well as take a written end-of-course exam" (College Board). In AP Research, students "explore various research methods and complete an independent research project [and] can build on a topic, problem, or issue [they] covered in AP Seminar or on a brand new topic of [their] own choosing. At the end of the project, [they will] submit your academic paper and present and defend [their] research findings" (College Board). These components make-up the grading criteria of this class too. High schools usually offer AP Seminar in grade 10 or 11, and AP Research the year after. Each course is a year long class.

Other examples of how capstone have been implemented include Chelsea High School, an urban high school near Boston, that lets students do individual capstone projects, but they are only remediations of homeworks and reflections on them. These 'capstones' are only offered to upperclassmen and unlike AP capstones, these projects are not personalized to a student's choice. (Moorel). Another set of schools in the Boston Public School district offer their 5th grade students opportunities to work on a group capstone project. They do not offer this opportunity to upperclassmen like Chelsea High does. Later, we will talk in-depth about Belmont Day School, a private school offering a capstone experience to its eighth graders.

Other schools have proposed different components to capstones which are more hands-on. Hanover Research, a consultancy firm that helps organization make decisions, created a report for the Northwest Independent School District titled "Best Practices in Capstone Project." Their research shows that there are "three general types of capstone .. which include projects, exhibitions, and courses" (Hanover Research). They have compiled a list of the common components of "capstone programs in high school throughout the country" (Hanover Research):

- curriculum-based research project
- set of experiments organized around a central problem
- internship in a local business

- community service project
- designing a product, service, or system

Some schools require their students to participate in capstones to graduate. For example, Johnston County Schools in North Carolina mandates "all high school students [to] successfully complete a graduation project" which includes "a research paper, a product, an oral presentation, and a digital portfolio" (Hanover Research).

These examples show a clear trend: capstone projects are mostly implemented by private schools or public schools situated in wealthy neighborhoods. However, we believe that urban schools will also benefit from the implementation of capstones. In order to understand this, it is imperative to address the obstacles that urban schools face in trying to implement capstone projects. Thus, it is first necessary to address why capstones are of such importance and the logistics surrounding their implementation.

IV.2 Benefits of Capstones to Students

Unlike the overemphasis on testing that was the unintended result of the ADP's report on schools' deficiencies in preparing students for success, this handbook aims to encourage an alternative method to make the K-12 experience meaningful and useful to all members of society, accessible to schools or students from any background. Allowing students to pursue and develop their personal interests with meaningful capstone projects within their own communities, an ideal way to implement project-based learning in today's classroom, drives students to become engaged in their own educational experience. Capstone projects are an escape from the "teaching to the test" mentality that often plagues the syllabi of performance-driven teachers, and students who undertake these projects have been shown time and time again to benefit significantly not only in their standardized test performance and classroom success, but also their lives post-graduation.

IV.3 Logistics of Capstones

With limited resources, educators in public schools focus on essential tasks like enhancing the enrollment rate and improving standardized test scores.

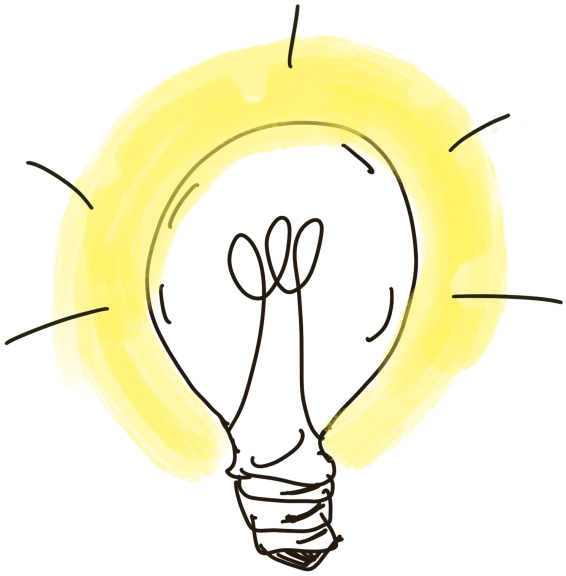

Figure IV.1: Students have the ability to choose their own topics for projects and thus ultimately own the creative process

They may be hesitant to adopt capstone projects into their curriculum because they seem too complex and expensive. It is normal for educators in public schools, who already are preoccupied with classroom challenges like covering their subjects' syllabi, to have concerns in mind about implementing capstone. Does it require giving each student an iPad? Do we need to hire more teachers to assist with the capstone program? The answer may be surprising to many people. Developing capstone projects does not have to be expensive. Only a few extra resources are needed to help students be successful in making individual capstone projects. And by investing in these resources, the institution's students will benefit significantly, by getting higher test scores. Capstones will further help students master self-starting and self-managing skills, which we will talk more about in later chapters.

Having specific resources may help schools develop a successful capstone program for their students. Luckily, not many of those resources are costly. Resources like high-speed internet access for online research, projectors, and whiteboards for multimedia presentations would be helpful to develop a successful program but are not absolutely necessary. It could potentially be provided by public libraries as well. Besides that, access to the local or school libraries would be helpful for students who like interact with physical sources like books and newspapers.

Maintaining a good relationship with the local community can also help schools to develop capstone projects at a low cost. Research shows that "successful high schools result from strong communities reinforcing teachers' efforts" (Coleman 1987). Schools may seek help and support from local organizations, non-profit organizations, and higher education institutions. However, these requirements are flexible and dependent on the circumstances of the institution trying to implement capstones.

Guidance is a necessity for the capstone experience. The role of the teacher is to provide guidance to students in the program and encourage students to solve problems with an innovative approach. There is no massive additional workload that needs to be added for the teachers. Their role is not to assign, provide, or generate project tasks for students, but to encourage and inspire them. On the other hand, mentors in the capstone projects are a resource for students who could provide guidance if need be. They can be teachers in the school, but they can also come from unexpected places, like other staff members of the school, the local community, local or nonlocal businesses, and higher education institutions. Take the Belmont Day School as an example; they have all their staff involved in the capstone projects, so even cafeteria employees could be mentors for students. People tend to feel fulfillment and satisfaction while providing help to oth-

ers, and this often becomes the intrinsic motivation for their mentoring. Thus far, the Belmont Day School has served as the prime model for capstone implementation. In the next section, the particular methods in which they implemented their individual capstone projects will be discussed.

IV.4 Example and Anecdotes

Capstones have been implemented at various schools with much success. For instance, Belmont Day School in Belmont, Massachusetts has a long-standing relationship with capstone work. The small, private Pre-K through eighth grade day school's eighth graders take part of a year-long process that begins in the summer leading up to eighth grade. They have a nearly 15-year relationship with capstones, and were applying project-based learning to their curriculum long before others. Monikered "The Capstone Journey," students take part in three phases of capstone work, and they ultimately produce a paper, project and an oral presentation by year's end. Students are trusted with great autonomy in this project ("Belmont.") In this academic year, students are exploring topics such as steroids in sports, the Cartoon Renaissance and the impact of the " body images presented by social media" on girls and how they view themselves.

The mentors for this project come from school staff. Whether it be dining hall workers, janitors or a teacher, the capstone project coordinator trust their staff to serve as mentors for the students in the program. It's not so much that anyone can be a mentor, rather the mentors for the project do not have to be someone with extensive experience in the projects that students choose. The mentors help guide and check in with the students regarding their projects, making sure they are hitting the standards. It's proven that in-house mentors do the trick, so it should be translatable to any school district. With appropriate CORI checks, faculty members in public schools could serve as solid mentors. They are likely from the community in which they work, further helping students connect with their surroundings. Also, Mentors can also be found online. With the modern technological climate, mentors can be e-mentors. Using LinkedIn or other networking sites as well as connections that teachers have, mentors can be found all over the place. There is no limit on their distance due to the potential of a connection via technology. Whether these meeting be via skype, telephone or in-person, mentorship from someone inside or outside the school helps students complete their capstone projects.

Elsewhere, Philadelphia students are reaping the benefits of what they call "PBL," Project Based Learning. At Science Leadership Academy students take part in a Capstone project during their senior years of high school. A student named James Thomas wrote and published a novel for his senior project. Philadelphia's Workshop School also allows student autonomy in their PBL work. They spend over half of each day researching and working on their individual projects. The school is completely project based.

Chapter V

Combating and Overcoming Potential Problems associated with Capstones

V.1 Confronting Resource Shortage

Lack of funding is a common concern from urban public school educators. The amount of funding a school receives is calculated by the funding formula of the specific region, which we introduced previously. Public schools in the neighborhoods with less tax income are often receiving less funding from local contribution than the public schools in the wealthier suburban neighborhoods. This is mainly because some districts do not have enough funding to support the education system, whereas the more affluent neighborhoods collect more tax from the residents, therefore, being able to spend more money on the financing for public schools.

If we take a closer look into the data from Massachusetts Department of Elementary and Secondary Education, for example, towns Lynn and Newton in Massachusetts, we will find out that local contribution makes a huge difference in the overall funding. Newton is a wealthier town than Lynn, and its local contribution to the public education is 225 times more than Lynn's local contribution. In order to figure out the funding formula, we want to know the foundation budget for each district first. The foundation budget is the representation of the total cost of providing an adequate edu-

cation for all students, calculated by the funding formula. In 2010, Lynn's foundation budget, which is from the government, was $11,256 per pupil, whereas the foundation budget for Newton was $9,028 per pupil (Massachusetts Department of Elementary and Secondary Education 2010). That's the amount of money the state assumes a district needs. Next, we want to know the required local contribution, which is calculated based on each district's ability to contribute local revenue to its education funding. In FY 2011, local contributions in Massachusetts were determined by adding 0.3 percent of each town 's total property values to 1.4 percent of the income earned by residents of the town (Massbudget). Then the CH 70 State Aid will fill the gap between a district's required local contribution and foundation budget. The required local contribution for Lynn is $2,763, per pupil, so the CH70 State Aid spent $8,493 to fill the gap. In comparison, Newton's required local contribution is $8,034 per pupil, so Newton only received $1,207 per pupil from the State Aid. Until now, Lynn had $11,256 in its budget, but Newton just had $9,241 in the budget (Massachusetts Department of Elementary and Secondary Education 2010). However, after the State Aid is determined, districts may contribute more if it is willing to. The huge gap shows up here. While Lynn was willing to provide $23 more besides the required local contribution, making the total actual budget $11,279 per pupil, Newton was willing to spend $5,195 in extra local contribution, making the total actual budget $14,436 per pupil. What does it mean? It means that schools in Newton have $3,157 more to spend on resources for each student that Lynn does, although the State Aid spent six times more money in Lynn than in Newton.

Acknowledging the fact that the problem of funding gap amongst different districts exists, we can look at the data in Boston, the Massachusetts city with the highest population. In 2017, the total expenditures per pupil in Boston is $20,302, which made the total expenditures in Boston $1.3 billion, according to the 2017 report from Massachusetts Department of Elementary and Secondary Education. The average total expenditures per pupil in the state is $16,014. The funding formula is different in every state. It is a positive sign that Massachusetts as a state is willing to spend more in urban schools since the urban public schools often face more challenges than suburban public schools do. A report from National Center for Education Statistics points out, urban children were more likely to be living in poverty than those in suburban locations, receiving less education support from the family environment, living with higher health and safety risks, and having difficulty speaking English (National Center for Education Statistics). Moreover, urban teachers had fewer sources available to them and less control over their curriculum than teachers in other locations, and urban school administrators had more difficulty hiring teachers than other schools (National Center for Education Statistics).

These challenges cannot be solved without extra resource and funding support.

Developing a project-based learning program is a low-cost and high-return option for all the educators. One of the core concepts in project-based learning experience is creativity, and creativity can be reinforced in the environment without fancy gadgets or expensive resources. Many easy and low cost project ideas and resource are available online. On a website called Youth Service America website, a article suggests dozens of low-cost or no cost project ideas, including encouraging every student to sign a pact and build a bully-free school together, spending time with senior citizens, and doing research on the positive effects of not using drugs or alcohol and presenting the result to the classmates (Youth Service America). Many projects only require cardboards, posters, paper, pens, and curiosity.

Moreover, when students think that they may need something more than their budget, teachers and mentors can help them to identify the goals of the project and find a more affordable alternative to achieve the goals. There are a few inspiring examples that how to challenge what we think we need and find a possible alternative instead. Doing research and collecting information are essential for capstone projects, but students don't need the newest version of iPad to dig into the topics they are passionate about. They could use the WiFi and desktops in the public library, or borrow and read the books on relevant topics from local libraries.

Students do not need to have the high-end filming equipments to make a short video. A smartphone and free editing applications online are great choices for students to make their ideas shine. Funding from schools is not necessary for students to launch their business ideas. The fundraising and sponsorship seeking can be part of the project, which will teach them valuable lessons on courage and negotiation skills.

Students do not have to speak with the professional mentors that hired by the school. They can reach out to their network or even talk to staff in the school to ask for help and suggestion. Schools can also reach out to the external resource and build the partnership with local community, including working with higher education institutes, local government departments, and non-profit organizations to develop the project-based learning program in the school. The capstone projects do not have to be prefect and well funded, because the resource that a school can provide is not a critical factor for capstone projects. Students mainly learn and grow from the unique experience by being the project owners, decision-makers, and action-takers.

Figure V.1: There's no fiscal cost to creativity. With such autonomy, the projects can be fun as well as productive

Once we trust that students already have the incredible innovation spirits, they will achieve more than we expect. It will be a meaningful experience for students to build something from scratch on their own and using available resources creatively. At the end of the day, that's what every successful entrepreneur does, using limited resource to solve a problem that once was perceived impossible

V.2 Institutional Obstacles – Meeting Curriculum Goals

An important clarification of this handbook's message is that, despite the well-supported criticism of over standardization and overtesting that has been cited throughout, there are objectively valid standards that an effective American public school education needs to adhere to. Schools have a responsibility at each grade level to prepare their students sufficiently for the next grade, and on a more general scope, schools should prepare their students adequately for the next stage of their lives. Meeting hierarchically imposed standards in the classroom is a generally public-approved way to "demonstrate student learning to the students themselves and to larger publics" (148). It may at first seem difficult to reconcile this necessity with the project-based, student-

driven pedagogical method that we propose implementing in schools. Although statistics demonstrate that capstone project-inclusive curriculums significantly improve classroom engagement, academic success, and standardized test performance, the question on many educators' minds may be how to evaluate in their own classrooms the extent to which the school, state, or national requirements are being met without structurally detailed assignments graded against stringent rubrics.

The quick answer to this question is that capstone learning gives students the confidence to navigate the existing standards and identify what they need to do to meet them, and that through engaging in self-driven projects, students' growth in more abstract areas such as "humanity, or tolerance, or knowledge of self" (156) can be assessed in addition to the traditional standardized comprehension skills currently listed in requirements. To an educator, though, this is an insufficient response. They seek genuine consideration of how a teacher in any subject can make sure that, even as students drive their own learning, are driving it towards a mastery of the necessary components of their grade-level standards in a subject. In general, this can be accomplished by looking at the bigger picture of each bullet-point standard as provided by the National Council of Teachers, and identifying how student projects can be guided to encompass these goals. More specifically, this section will address each subject area and the standards currently outlined for it, and offer justification for project-based learning as a method for students to achieve said standards.

V.2.1 Social Science

The National Council for the Social Studies (NCSS) provides 10 themes that should be a part of a social studies education. According to The Art of Critical Pedagogy, the themes presented a "framework [that] closely parallels the goals of social studies teachers" (149). A major component within the proposed standards for social studies education include immersion within a student's own culture. In The Art of Critical Pedagogy, students get out into their communities and make a difference and learn from their surroundings. Students can expand learning beyond the classroom when learning in their home environments. For example, a women's basketball team provided a youth clinic which taught them leadership and gave access to coaching otherwise inaccessible in Oakland, California. It is more meaningful for students when they can make an impact in their own communities.

Another standard proposed by the NCSS calls for the need for students to study human

psychology and sociology. Specifically, the NCSS says students should study both the individual and the group (150). When doing project-based learning in their own communities, students will find more interest in their work and take ownership of it. When students can make difference in their immediate surroundings and see their learning come into fruition, then their engagement within their projects will ramp up. They study their communities both on and individual and a group level, widening their understanding of how their own community works. The NCSS also emphasizes a study of power of not only who is in power, but how one becomes powerful. An understanding that the now-powerful can come from the once weak serves as inspiration for students. Power structures in urban communities are tough to figure out, because sometimes those who seem the most powerful may actually be the weakest. For example, drug dealers may seem like they run a neighborhood, but in reality they could be jailed at any moment[MS1] . Students learning in their own communities can help them make changes.

V.2.2 Mathematics

It is arguably more difficult to conceptualize a capstone project in a mathematics class at the high school level than it is in a humanities course, where research and writing skills more clearly tie into required curriculum standards. Students at urban schools and specifically students of color are often already behind grade level in mathematics by the time they enter their final years of high school (US Department of Education, 2005), making it an even more daunting task for a teacher to make sure they meet every requirement asked of them over the school year. This might dissuade deviation from the current tradition of teach-to-the-test-style pedagogy. This is a case where it is important to step back from the day-to-day and look at the bigger picture of what could be accomplished as a student carries out a capstone project. The data collection and processing, statistical comprehension, and critical problem solving they would accomplish by delving deep into a question relevant in their own mind and community would reasonably be a more meaningful experience to the student than a worksheet of math problems. When presented with that worksheet in a different context they would be more confident and better prepared to approach it.

The National Council of Teachers of Mathematics (NCTM) gives an outline for the standards on math education that emphasizes words that similarly describe the capstone process – "problem solving…in other contexts," "adapt a variety…of strategies," "reflect on the process," and perhaps more importantly, the ability to apply that learning.

Bringing the passion inherently involved in a capstone project into a math classroom is be a foundational shift in a student's mathematical education and can drive them towards the goal of success in a subject that is often a weak area both in student interest and in educator success in underfunded urban schools serving socioeconomically and racially oppressed populations. Meeting standards is a compelling argument for, rather than an obstacle to, adjusting teaching methods to implement project-based learning in the context of the mathematical classroom. A project-based learning experience has a positive effect on the development of mathematical competencies. A study that involved Los Angeles schools reveals the positive correlation between the seminar class and math ability. The study points out that seminar classes encourage students to do research and draw a valid conclusion after thinking about the covariation of two variables in datasets. Students not only are better at understanding the mathematics at a conceptual level, but they also showed an enhancement on the ability to reason mathematically (Rogers, Morrell, & Enyedy, 2007). For many students who choose to do a research project, collecting datasets and making sense of the datasets are the essential and critical steps of researching. To sum up, students' mathematical competencies will improve when they choose the scientific research approach in their projects, which is a common option in project-based learning course

The National Council of Teachers of Mathematics (NCTM) in the United States outlines the standard of a high-quality school mathematics program. This standard aims at supporting teachers and educators to design the school program, as well as addresses the fundamental aspects of mathematics ability. The five aspects NCTM listed out are Problem Solving, Reasoning, and Proof, Communication, Connections, and Representations.

Students in a project-based learning program are often engaging in the same activities the NCTM suggests in the standard. For example, the standard describes the representations by saying "mathematical ideas can be represented in a variety of ways: pictures, concrete materials, tables, graphs, number and letter symbols, spreadsheet displays, and so on… When students gain access to mathematical representations and the ideas they express and when they can create representations to capture mathematical concepts or relationships, they acquire a set of tools that significantly expand their capacity to model and interpret physical, social, and mathematical phenomena"(NCTM). Using tables, numbers, and graphs to show the relationship or model ones make to present their ideas is common in students' projects. Students boost their mathematical skills by making an effort on capturing valuable information related to the problems, interpreting information and datasets, coming up with the model and relationship, and expressing ideas.

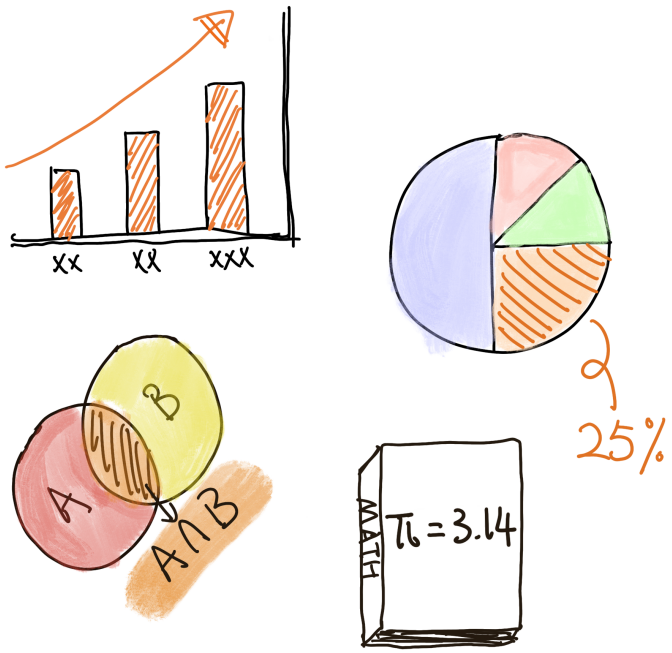

Figure V.2: Even in mathematics, capstone projects can benefit academic success. It takes the book to the real life

V.2.3 English

As mentioned above, schools cannot redraw their curriculum map; however, it is possible to both implement a capstone and adhere to the existing curricula and standards. Students can use part of their English and literature classes to review and respond to research for their capstones because these processes are in line with the NCTE standards for English/literature art programs. This will allow the teacher to guide and mentor these students through the research and response phases of the capstone.

The NCTE provides twelve standards that K-12 English/language arts programs should be centered around Figure V.3.

These standards encompass a variety of processes which are part of capstones and include identifying one's interest, researching, critical-thinking, responding, presenting, reading, and writing. When students contemplate their capstone's topic, they need to "conduct research on issues and interests by generating ideas and questions … and synthesize data … to communicate knowledge" (Figure V.3). As suggested above, researching their capstone topic will give students exposure to a variety of sources from multiple eras.

For the remaining standards we use the example of a student from the Belmont Day School, Student X, who wants to research the "state of the MBTA, and how it could serve Greater Boston better" (Belmont) – a research capstone that could potentially impacts the whole Greater Boston community.

To engage in research, many students may use the internet and books. Over the course of the capstone, new obstacles will encourage students to conduct more research when trying to understand new concepts and polish current ones (standards 7,8,1). Student X might start by searching the web on the MBTA system. Alternatively, if the student does not have access to the internet, he or she can visit the school library and browse the transport section. Later on, if student X has conflicting information about a topic, the student can come back to clarify his or her understanding of the MBTA system.

To understand new concepts, students will have to spend more time analyzing spoken, written, and visual sources. These documents might comprise of peer-reviewed texts, blogs, images, videos, and other non-verbal articles which would then require students to "apply a wide range of strategies to comprehend, evaluate, interpret and appreciate"

1. Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.
2. Students read a wide range of literature from many periods in many genres to build an understanding of the many dimensions (e.g., philosophical, ethical, aesthetic) of human experience.
3. Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics).
4. Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
5. Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
6. Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts.
7. Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.
8. Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
9. Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions, and social roles.
10. Students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum.
11. Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.
12. Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Figure V.3: http://www.ncte.org/standards/ncte-ira

(Figure V.3). To make the MBTA system better, student X might conduct research on the current MBTA system by reading, going to the transport office, or watching videos on the logistics of the system. Each of these sources will require the student to consider the source from unique perspectives.

After understanding new concepts, the newly formed interpretations can be based in an "aesthetic," "philosophical," or different perspective. Some of these perspectives may come by interacting with other sources or by combining ideas from multiple sources (standards 1,2,3,9). Let us assume student X finds that the highest population traffic is at the Park Street train stop. Let us also assume that student X also finds that there are only two turnstiles to enter the stop. He or she may come to a conclusion that we need more turnstiles at stops like Park Street. This shows that combining and interpreting ideas of different sources is an important skill that can be developed through research capstones.

The process of encountering numerous problems, thinking through them, and reaching epiphanies is a key component of capstones. Communications with mentors, teachers, and other students about the aforementioned problems and solutions would require these students to cater to a variety of audiences "across cultures, ethnic groups, and social roles" (Figure V.3). This would enable students to adapt to new audiences by adopting different use of "spoken, written or visual communication" (Figure V.3, standards 4, 5, 6, 10, 12). Coming from a multicultural school, at the end of the year, student X might have to present his or her capstone to classmates, teachers, and parents from different ethnic backgrounds and social roles. He or she can also choose to use presentation techniques or write a formal paper about his findings.

In the process of "researching and responding," students (like student X) would "participate as knowledgeable, reflective, and creative member of the literary community." While forming new opinions or presenting facts, students would over time, automatically gain insight on the subject matter of their choosing, enabling them to participate in scholarly discussion and conversations.Student X may have to write progress reports which would require him to analyze his findings, and write reflection papers on what he has learned. Of course, these students would need a lot of guidance from their instructors of the school's English/language arts program as is discussed in a later section (5e).

One suggested approach to adhere to this curriculum map is by treating an English classroom as the perfect setting for in-class discussions and generation of new ideas for

capstone work. Instead of spending fifteen minutes to learn about Shakespeare or discuss summer reading, students can work on their capstone and use their instructor as a guide while also adhering to the governmental standards for these classes – that is, without requiring extra time for capstones.

V.2.4 Problem Solving

It is arguably more difficult to conceptualize a capstone project in a mathematics class at the high school level than it is in a humanities course, where research and writing skills more clearly tie into the required curriculum standards. Students at urban schools and specifically students of color are often already behind grade level in this subject by the time they enter the final years of high school (US Department of Education, 2005), making it an even more daunting task for a teacher to make sure they meet every requirement asked of them over their nine months together, which might dissuade deviation from the current tradition of teach-to-the-test-style pedagogy. This is a case where it is important to step back from the day-to-day and look at the bigger picture of what could be accomplished as a student carries out a capstone project. The data collection and processing, statistical comprehension, and critical problem solving they would accomplish by delving deep into a question relevant in their own mind and community would reasonably be a more meaningful experience to the student than a worksheet of math problems, and then when presented with that worksheet in a different context they would be more confident and better prepared to approach it. The National Council of Teachers of Mathematics (NCTM) gives an outline for the standards on math education that emphasizes words that similarly describe the capstone process – "problem solving…in other contexts," "adapt a variety…of strategies," "reflect on the process," and perhaps more importantly, the ability to apply that learning. Bringing the passion inherently involved in a capstone project into a math classroom can be a foundational shift in a student's mathematical education and can drive them towards the goal of success in a subject that is often a weak area both in student interest and in educator success in these underfunded urban schools serving socioeconomically and racially oppressed populations. Meeting standards is a compelling argument for, rather than an obstacle to, adjusting teaching methods to implement project-based learning in the context of the mathematical classroom.

Figure V.4: Not only is it important for schools to engage the students, but immersing into the community is key to students benefiting from the full learning experience

V.3 Utilizing the Community

The implementation of capstone projects in urban schools such as Boston Public Schools has various obstacles from the community. Systemic racism perpetrating American school systems is likely the biggest obstacle. Also, poverty and crime are challenges to implementing capstones. There are issues including a lack of mentors, no other schools doing capstones and race, ethnicity and culture.

Often there are "negative assumptions about youth's ideas and decisions" (Ozer). This can happen in the aforementioned systemic racism or because of a student's socioeconomic status. Adults do not always trust the youth, and this could be exemplified in communities where adult leaders feel the need to ascertain their value. There are "assumptions by adults" made regarding topics that students choose in their projects (Ozer). Assumptions span beyond capstone projects. Oftentimes adults assume poor children will steal, or they are incapable to do work because they may not have adequate nutrition. Adults tend to doubt advanced thinking of students, and often overlook the creative genius of youth. In a place where there is an expectation for students to perform well, such as in a wealthier community, it is different from an urban school district that may not have the same resources. Expectations of students can stem beyond their roles in school.

Furthermore, there are obstacles for students performing well in capstone projects in the form of race, ethnicity and culture. There are many issues urban public school students face that could prevent them from working on capstone projects. In Eric Jensen's study on poverty stricken children and their classroom engagement, he outlines six reasons for possible struggles. One is "relationships," that "the probability of dropping out and school failure increases as a function of the timing and length of time that children are exposed to relational adversity" (Jensen). Unfulfilling and tumultuous relationships within the home and community directly correlate to failure in school. This can come in forms as drastic as abuse, or as simple as a student having to work to make money for their family to afford rent and put food on the table. Jensen also references parents of poorer families having a tougher times to adjusting their parenting styles for children with learning disabilities. One study found that 60 percent of the differences in test scores between poor and wealthier schools districts can be attributed to relationships and neighborhoods (Goldhaber). Before schools, there are various issues for students that span well beyond their educational careers that does affect their ability to learn and prosper in a school setting. Youthful students may see struggles at home that can lead to

distraction in schools. Their focus can be diverted to problems elsewhere. Students in poverty have a lot on their minds and likely cannot focus on their work to the same degree as students in wealthier communities that have less to worry about. Students can come from drug-laden neighborhoods and their previous education may not be adequate. This deficit is possible to overcome, and capstones can provide students with the autonomy they need.

V.4 Student and Family Engagement

Complications at a governmental or institutional level are predictable, but there may exist a more fundamental problem: the mindset of students and their parents toward capstones. Just like in the case of Morell and Andrade's implementation of critical pedagogy in public schools, urban schools could have a "heavy [involvement] with the students .. and parents" (Morell et. Al, 23). It is crucial for students to accept a new teaching style and parents to be optimistic and supportive of it. In most urban schools, the pedagogy of individual capstone projects are not used.

When a new teaching style is implemented, the students may be reluctant to embrace it. Some may question the need for project-based learning while others may be worried about their assessments. On top of these initial implementation problems, students may find it difficult to learn through a fairly "unstructured" process, unstructured in comparison to all the other classes they are enrolled in. Looking at their child's new class, parents, who may already have problems common in urban areas like poverty, discrimination, crime etc. to deal with, might also worry about how college admission officers might react to capstones. Understandably, implementing capstones can certainly cause distress in both the parent and their child but there are numerous ways in which schools implementing capstones can support the students and address their parents' concerns.

Capstone projects could be a daunting task for students for two reasons. Firstly, capstones come with its initial implementation problems such as grading concerns or having an unstructured nature. Secondly, capstones have their "in-progress" problems such as not finishing goals or having an unknown amount of freedom given to students to set and complete their project tasks.

Capstones are extremely unstructured and they can be challenging for numerous stu-

dents. Dr. Caroline Ketcham, a professor at Elon college and co-director at Elon University's BrainCARE Institute, wrote an article in Elon University's Center for Engaged Learning page titled "Inspiring Student Ownership of Capstone" where she addressed a few questions regarding effective capstone experiences. Being someone who has worked with capstones at a college level, she believes that the first step to capstones is "to address the worry and help structure course outcomes and expectations for students … through a new and vague process" (Ketcham). A process that is daunting for college seniors is highly likely to be resisted by college students who are used to structure. We all know that most classes in high school follow a rigid curriculum map and most capstones are very unstructured; introducing such a dissimilar process might worry students on what is expected of them.

Although capstones are supposed to promote "design-thinking" (Juliani et. al, 74) and help students "own the creative process" (Juliani et. al, 129), the large amount of freedom given to the student can harmful rather than helpful. It is common knowledge that projects often do not give the desired outcome right away and failing is almost inevitable. The seemingly new amount of freedom students get from capstones could throw some students off-track. Students may not adhere to their own set deadlines and their final projects may not work as they intended for them to. This "failure" can be demotivating (which it is). These issues need to be addressed for a change to be seen in the student's mindset towards capstones.

Parents too, would be concerned about the effect of capstones in their child's school and its effect on college acceptance. In a scholarly study "Is Hovering Smothering or Loving?," researchers examine the role of helicopter parenting and their child's self-worth and school engagement. The results of the study show that "helicopter parenting was associated with lower levels of self-worth" (Nelson et. al, 1). The more the parents were overinvolved in their child's life, the lower the child's self-worth was. The regression analysis of the study concludes that helicopter parenting results in high maladaptation to risk behaviours like lower school engagement (Nelson et. al, 2). John Rosemond, a public speaker and writer on parenting, wrote a public intellectual article on the Hartford Courant on "Parental Hovering Delaying Kids' adulthood." Rosemond along with a many other well-reputed psychologists, educational scholars, and research centers believe that "today's parents, by contrast, give short ropes, lie in their children's beds and stew in their children's juices. They organize their children's games, social lives and after-school activities. They help their kids with homework, help them study for tests, mediate their conflicts with peers, and, well, get involved" (Rosemond). Another article on parental involvement in K-12 education written by written by the American

Institute of Research (AIR) concluded that only 57% of parents of public school going kids and 81% of parents of private school going are "satisfied with academic standards of the schools" (AIR). Given this over involvement and yet, dissatisfaction with the academic standards of schools, it is easy to come to a consensus that parents are likely to question of capstones might affect their child's other academic activities and extracurricular. More so, literature shows that this over involvement also during college acceptances. An article in The New York times about parents' over involvement in college admissions states that "parents 'too invested' in college admissions make their children anxious" (Marcus). This claim is backed by many others deans of colleges, and psychologists, including Harvard's dean of admissions William Fitzsimmons (Marcus). When parents are so over committed to their child's college acceptances, they probably would make sure that everything their child is doing is school is pro-college, including capstones!

On top of this over-involvement, parents already have to deal with urban problems and they might not be accepting of a new pedagogy in their local school. An article written in University of Chicago's School of Social Service Administration Magazine (SSA) titled "Social Inequalities and Urban Family Life" examines the challenges urban children, and families face along with social program that are created to address these challenegs.life in wealthy and urban city sites. As we all know, "many children and families experience poverty, hunger, substandard housing, crime, and under-resourced schools and communities" (UChicago's SSA). In a place where "parents struggle to find jobs," capstone projects might seem an unnecessary burden on the family. Parents from urban neighborhoods are understably concerned about how new commitments for the child, like capstones might utilize extra-time from the students which could have been used to earn some extra dollars or other school experiences because the parents may not have time to give these students and enriching out-of-school experience.

Not all these problems are easily solvable and some require more effort to overcome than others, in this section, we'll offer some suggestions on how to deal with students' and parents' potential concerns about capstones. Urban schools can reassure both students and parents that capstones are beneficial!

To help students feel secure about their project, they will need a lot of guidance and reassurance about their ideas and work. A teacher's, mentor's and a parent's engagement in their child's/student's capstone is of paramount importance (Juliani et. al, 58). Mentors and instructors would play a crucial role in driving a student's ideas to a completed capstones AND in teaching the skills a student would need throughout the course of

the project. In The Art of Critical Pedagogy, Andrade and Morell have explained that it is extremely crucial for "educators [to] identify and articulate … the vehicle for delivering critical pedagogy" (Andrade et. al, 159).

Similar to Andrade and Morell's vision, trained teachers, especially in English and Social Sciences, where projects have always been common, are capable of helping students find the "sweet-spot" of interest in these capstones: in particular, it is possible for English literature educators to guide these students to develop research skills and learn to overcome the challenging initial phases of their capstone which they selected because of their passion/interest. As explained in Empower, without being "self-directed" (Juliani et. al, 111) students would not move past research-intensive phases resulting in the termination of their projects or students would not ask questions to generate enough interest to be excited to push through the challenging phases, again resulting in the termination of their projects (Juliani et. al, 115.). When we talked about capstones meeting English-literature standards, we suggested to let the instructors of different classes participate in different aspects of the capstone so as to "tap into student interests [rather than] making the subject interesting" (Juliani et. al, 121). To explain this we can use an example mentioned in the book Empower. When one of the authors of the book , A.J. Juliani, was in high-school, he despised math and spent a lot of time playing nothing but soccer. One day, his math teacher who he respected immensely asked him to take a programming class and he did it our of his liking of the teacher. Juliani who had never been a "numbers person" found that programming gave "numbers and formulas power." He ended up making a computer football game his capstone in his junior year of high school. He said "that experience lead me to become the type of teacher I am today" (Juliani et. al, 68). Without his educator's push and guidance Juliani would not have been able to make this game and similarly, an educators guidance may be helpful for students to feel secure about their capstones.

Teaching students the difference between failure and failing can help boost and confidence and promote a positive attitude towards failure to meet goals and achieve desired results. Juliani and the other authors defines failing as a temporary repetitive process that leads to success and failure as permanent stop: equivalent to giving up. Just like Juliani, "what we really want for our students is not for them to fail, but … for them to get back up and try again" (Juliani et. al, 198). For example, Student Z, an 8th grader in Belmont Day School is researching what Artificial Intelligence is. Writing research papers on AI is a daunting task for Ph.D. students and it is very likely that student Z might initially be intimidated by the complexity of AI research it. This might disrupt the 'pre-set structure' or student Z plan. If student Z is upset about this "failure," maybe his men-

tor could guide him by either helping him research or brainstorming if they should narrow his idea and set a new deadline to move past the research phase. Capstones are "all about the failing" and "learning is contagious" (Juliani et. al, 199). If given a push in the right direction and instill a positive attitude, students will learn to adjust in the organized chaos of capstones. Wrestling with a complex topic will necessarily produce failing. Hopefully, this failing is of the beneficial kind teaches students the importance of "grit, resiliency, and [a] can-do attitude" (Juliani et. al, 199).

The most important challenge is likely to be to convince parents on how capstones will be beneficial in their child's life because parents would be uncertain about capstones effect on their child's colleges acceptance and job prospects.

One of the first steps to convince parents on the benefits of capstones is by introducing capstones to them. When parents hear testimonials from like-minded parents about the benefits of capstone on their child's life, they may be more accepting of capstones. In The Art of Critical Pedagogy, one example of a parent's testimony which can help other parents believe that capstones are beneficial for their children talks about projects as a way to improve self-realization. A parent, Melinda saw "[her] daughter's sense of herself and responsibility to others grow". Another parent, Linda talked about her daughter who "academically, has never done better" and her daughter "seems to feel comfortable with herself" and is "less rebellious and angry" (Critical Pedagogy). In an urban environment, where students may have experienced systemic discrimination based on race and socioeconomic status, student confidence as demonstrated in Melinda's and Linda's daughters is really important. If parents know why this is important, they will be more engaged in their child's project and think about a capstone's long-term benefits. The authors of The Art of Critical Pedagogy explain this well: "The more the students value themselves, the more they are able to learn from their experiences, successes and failures. In most urban schools, students are taught to undervalue or, worse, to devalue their own experiences. Without a strong sense of self-respect in the context of school and society, it is virtually impossible for a person to engage in the praxis of self-realization" (Andrade et. al, 78).

Another way to help parents rethink their position about capstones is by familiarizing them with the benefits of capstones and how they may lead to better college and job prospects. Families in urban neighborhoods have numerous things to worry about and adding more requirements to their child's education can increase reluctance rather than acceptance unless capstones can offer something greater in return, and they do!

If urban schools educate parents that capstones and college acceptance, and capstones and job prospects are positively correlated, parents will worry less and be engaged in capstones. As an example, if parents realize that AP capstones were created for the purpose of "proficiency in critical thinking and communication skills" among "incoming [college] freshmen" because "higher education faculty and administrators" are seeking students with these qualities (College Board). This is official information from College Board's AP Capstone page which explains that college admission officers and faculty want students who have participated in capstones. More so, the skills they talk about such as "critical thinking and communication skills" are the ones we mentioned when we talked about the skills employers want from their employers.

Lastly, capstone are a great opportunity for students as they can also help convince their parents that engaging in capstones may be beneficial to the community. For example, if the school requires students to choose topics relating to their community, the student's capstones can end up helping his or her community. If capstone ideas are focused on specific urban neighborhood problems, like student X's MBTA research for the Boston community, the people in the urban community, that is, the parents themselves will be more inclined to help the child with the capstone. Just like Andrade and Morell's model, instructors could "create a critical counterculture" (Andrade et. al, 160). This "counterculture" refers to a large variety of issues facing their local community, lead discussion on how students capstone can help the community – that is, instead of having discussion on texts like Hamlet, part of the class time goes in discussion of community issues to brainstorm capstone ideas that match both student interest and help the community.. By these discussions, instructors would create "opportunities for students to use what they are learning in ways that directly impact their lives" (Andrade et. al, 160).

Chapter VI

Conclusion

Adding capstones to a student's academic trajectory creates a new and valuable type of learning. Capstones have worked for people of all different backgrounds and in different schools systems. Theo Epstein became the World's Most Influential Leader in 2017, and his path started with a baseball related capstone. That was his interest, and it is up to any student to pursue theirs. Capstones help students with meeting academic standards, passing standardized tests and offer a supplement to traditional classroom learning.

In reading this work, we hope education professionals find answers to their questions about why and how capstones can be implemented into their curriculum. All school districts have the ability to implement capstones, and with this guidebook we hope many educators utilize capstones and project-based learning. Further, these guidelines can be used at any school district. While our focus was what was right in our backyard, Boston Public Schools, but any school district can implement capstones. We hope that educators from any place find this guidebook worthwhile and useful to their curriculum.

Chapter VII

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