A.2 Target Population

SySTEM Phoenix proposes to open a 6th-12th grade charter school in downtown Phoenix focused on using science, technology, engineering, and mathematics (STEM) to teach critical thinking and problem solving skills. SySTEM Phoenix believes science, technology, engineering and mathematics are the foundational pillars of a 21st century society and the key drivers of innovation that will propel our country forward. . By offering a highly integrated academic program and leveraging Arizona's robust STEM community, SySTEM Phoenix will transform students into active learners and practitioners in the field.

Strategically located in or near what has been dubbed the "Bioscience Corridor", SySTEM Phoenix targets the needs of the downtown residents currently part of the Phoenix Elementary and Wilson school districts. The gap between the skills learned in the public education sector and those required of a 21st century workforce is rapidly growing. Only 64% of those living within the Phoenix Elementary School District graduated from high school and 18% from college.[1] Meanwhile, The Georgetown University Center on Education and the Workforce projects nearly two-thirds of the jobs available by 2018 will require postsecondary education. [2] President Obama elaborated on the situation in his 2013 inaugural address:

> We understand that outworn programs are inadequate to the needs of our time. We must harness new ideas and technology to remake our government, revamp our tax code, reform our schools, and empower our citizens with the skills they need to work harder, learn more, and reach higher.

SySTEM Phoenix will serve the residents of the downtown Phoenix community, who exhibit some of the highest indicators of poverty and the lowest indicators of academic achievement in the city. SySTEM Phoenix's approach will meet the needs of the community by providing a rigorous educational program focused on teaching critical thinking and problem solving skills through STEM subjects and instilling the values necessary for students to use this knowledge to improve the community.

A. Description of the Target Population

The target area for recruiting students to SySTEM Phoenix will be the 2-mile radius from the proposed Downtown Phoenix school location (approximately 1st Street and Washington Avenue), which overlaps with the boundaries of the Phoenix and Wilson Elementary School Districts, and lies within the Phoenix Union High School District.

Description of Community

Statewide, the Hispanic demographic continues to grow by large numbers. Data from the 2010 census marked a 46% increase in Hispanic residents since the last census. Further, the majority of Arizona's

[1] Proximity. (2013). *Arizona School District Demographic Characteristics.* Retrieved from: http://proximityone.com/sd_az.htm
[2] Carnevale, Anthony, N. Smith, & J. Strohl. (2010 June) Help Wanted: Projects of Jobs and Education Requirements Through 2018. Georgetown University Center on Education and the Workforce. Retrieved from: http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/FullReport.pdf

school-aged children are Hispanic. The population of the target area is racially mixed though predominantly Hispanic: 61.1% Hispanic, 14.9% White, 6.7% Black, 3.2% American Indian, 1.8% Asian, and 13.9% identifying as other. The Hispanic population in this area is markedly higher than the city and state averages of 40% and 29.7% respectively. Additionally, 61% of the population living within the Phoenix Elementary School District is Hispanic or Latino, which correlates to higher percentages living in poverty. Within the Phoenix Elementary School District 45% of households make less than $25,000 per year, resulting in many families living at or below the federal poverty threshold (40% of all families with children live at or below the federal poverty level). The Beat the Odds study, an initiative of the Center for the Future of Arizona, identifies specific challenges for low-income Latino students:[3]

- Latino youth comprise 43% of Arizona's K-12 enrollment and will soon become the majority in Arizona.
- Fourth-grade Latino students in Arizona have an average score on the national reading test that is 22 points lower than White students.
- The four-year high school graduation rate for Arizona Latinos is 67.4% compared to 73.4% for the state
- Latinos only account for 13.3% of the population at Arizona's three state universities.

The densely populated area of downtown Phoenix comprises some of the highest poverty rates in the city and is the home to over 4,000 children between ages 10-14.[4] Census data indicates 40% of all families in our target area with children under18 years of age are below the poverty level, which is double the state average. Further, one in four children in the area come from single-parent homes. Based on data from comparable school districts in the target area, we estimate 80-90% of SySTEM Phoenix's student body will qualify for free and reduced lunch.

In addition to the high poverty that students within the target population battle on a daily basis, data from the U.S. Census' Survey on Educational Attainment from 2006-2008 highlights several alarming trends about the target population's educational achievement:

- Overall, 64% of those living within the area graduated from high school and 18% from college.[5]
- Of individuals 18 to 24 years old, 43% did not finish high school and an additional 30% did not go beyond high school graduation.

These statistics clearly demonstrate the need for a high quality school that will provide a sure pathway to college readiness. To meet this need and dramatically increase the percent of students prepared for college, SySTEM Phoenix will implement a gradual build out plan, beginning in 6th grade and adding grades each year until eventually serving grades 6-12. This plan will ensure all students benefit from a continuous STEM educational experience. As a result, SySTEM students will graduate with a firm foundation in critical thinking skills, problem solving abilities, and awareness of how to use STEM to

[3] Beat the Odds 5 Year Report: Research into Action. (2012). [PDF document]. Retrieved from: http://www.beattheoddsinstitute.org/five-year/index.php

[4] City-Data. (2013). [Interactive map of *Residents with Income Below the Poverty Level (%)*]. Retrieved from: http://www.city-data.com/poverty/poverty-Phoenix-Arizona.html

[5] Proximity. (2013). *Arizona School District Demographic Characteristics.* Retrieved from: http://proximityone.com/sd_az.htm

create innovative change in their communities. SySTEM Phoenix's model will provide integrated, applied learning experiences that allow students to become active participants in their learning and overcome the obstacles they face on a daily basis.

Analysis of Surrounding Schools

Currently, the majority of school options in Phoenix neither prepare students for academic success nor engage them in STEM career paths. In 2012, the performance of sophomores across all of Maricopa County on Arizona's Instrument to Measure Standards (AIMS) reflects this failure, 36% did not pass mathematics and 55% did not pass science.[6] Further, although over 42% of the county's students are Hispanic, the Arizona Department of Education's most recent reporting indicates 27.3% of Hispanic students in Maricopa County did not graduate from high school.[7]

In the proposed target area that SySTEM Phoenix will serve, there are only eight schools with "A" or "B" ratings. Upon closer inspection, these schools fail to meet the dual goal of providing exemplary educational opportunities and offering those opportunities to *all* students. Both "A" schools have 0% of students qualifying for free and reduced lunch and fail to demonstrate a commitment to all students. The "B" rated schools do have populations more representative of the target area, but fail to cultivate the academic success that all students deserve. Because state ratings are partially growth-based, these "B" schools have maintained high ratings despite the fact that only about half of the student population is passing the AIMS, regardless of subject area. The data tables below demonstrate a clear need for schools that can change the current educational landscape for students living in poverty and prove that indeed *all* students can achieve academic success.

Table A.2.1: Demographics of Public Elementary Schools in Target Area – Zip Codes 85003, 85004, 85006, 85007

School Name	School Type	Number of Students	Free and Reduced Lunch	AZ Learns A-F Rating	Median Growth Percentile (Avg. R & M)
Children First Academy – Phoenix	Charter K-8	312	91%	D	36
Kenilworth	District PreK-8	653	84%	B	57
Lowell School	District PreK-8	694	86%	C	52
Summit	Charter K-8	538	89%	C	55

[6] "2012 AIMS & AIMS A Results" for Sophomore (2014 cohort). [Excel Document]. Retrieved from: http://www.azed.gov/research-evaluation/aims-assessment-results/

[7] "2011 Four Year Graduation Rate Data" and "2012-2013 October 1 Enrollment". [Excel Document]. Retrieved from: http://www.azed.gov/research-evaluation/graduation-rates/http://www.azed.gov/research-evaluation/graduation-rates/ and http://www.azed.gov/research-evaluation/arizona-enrollment-figures/

Arizona School for the Arts	Charter 5-12	746	N/A[8]	A	53
Garfield School	District PreK-8	435	95%	B	61
Whittier	District PreK-8	508	87%	C	54
Ralph Waldo Emerson	District PreK-6	539	90%	C	50
Thomas A. Edison	District PreK-8	604	94%	B	62
ASU Preparatory Academy	Charter K-12	583	72%	B	58
Keystone Montessori	Charter 6-12	207	N/A[9]	A	54
Capitol	District K-8	606	89%	B	59
Mary McLeod Bethune	District PreK-8	503	95%	B	65
AVERAGES OF AREA SCHOOLS			88%		55
STATE AVERAGES			59%		

Table A.2.2: Academic Performance of Public Elementary Schools in Target Area– Zip Codes 85003, 85004, 85006, 85007

School Name	Math AIMS %Passing 8th Grade	Reading AIMS %Passing 8th Grade	Science AIMS %Passing 8th Grade
Children First Academy – Phoenix	15%	37%	22%
Kenilworth	42%	76%	56%
Lowell School	41%	67%	53%
Summit	38%	54%	42%
Arizona School for the Arts	94%	98%	99%
Garfield School	46%	62%	44%
Whittier	43%	58%	47%
Ralph Waldo Emerson	N/A	N/A	N/A
Thomas A. Edison	51%	56%	40%
ASU Preparatory Academy	47%	66%	57%
Keystone Montessori	88%	100%	100%

[8] School does not report Free and Reduced Lunch (FRL) data, but is estimated to be well below 50%.
[9] Ibid.

Capitol	53%	63%	57%
Mary McLeod Bethune	48%	59%	39%
AVERAGES OF AREA SCHOOLS	51%	66%	55%
STATE AVERAGES	57%	72%	68%

Table A.2.3: Demographics of Public High Schools Options for Students in Target Area

School Name	School Type	Number of Students	Free and Reduced Lunch	AZ Learns A-F Rating	Median Growth Percentile (Avg. R & M)
Bioscience	District	287	63.5%	B	40
Camelback	District	1866	86%	C	46
Carl Hayden	District	2140	91%	C	56
Central	District	2326	87%	C	50
Cesar Chavez	District	2228	74%	B	58
Franklin	District	272	85%	A	79
Metro Tech	District	1417	89%	B	61
North	District	2612	79%	C	49
South Mountain	District	1837	83%	C	50
AVERAGES OF AREA SCHOOLS			82%		47
STATE AVERAGES			59%		

Table A.2.4: Academic Performance of Public High School Options for Target Area

School Name	Math AIMS %Passing 2014 cohort	Reading AIMS %Passing 2014 cohort	Science AIMS %Passing 2014 cohort
Bioscience	86%	99%	95%
Camelback	36%	61%	25%
Carl Hayden	40%	54%	30%
Central	39%	61%	25%
Cesar Chavez	42%	67%	35%
Franklin	56%	93%	32%
Metro Tech	51%	80%	30%
North	43%	71%	49%
South Mountain	37%	62%	33%
AVERAGES OF AREA SCHOOLS	48%	72%	39%
STATE AVERAGES	60%	80%	42%

The addition of a 6th-12th grade school in the downtown Phoenix area focused on innovative STEM education would provide a critical pathway to the STEM college and business community. SySTEM Phoenix will begin educating students in 6th grade to ensure alignment with research about student success in STEM areas. Studies show 8th grade mathematics scores strongly correlated to success in rigorous STEM courses at the secondary level.[10] This occurs because students not performing at grade level continuously struggle to catch up but fall behind at an increasing rate as courses become more specialized. As a result, student develop negative self-perceptions about their ability in math and science that cause them to "opt out" of STEM pathways. By starting in 6th grade and providing hands-on, engaging Problem-Based Learning experiences that draw from collaboration with local STEM industries, SySTEM Phoenix will ensure students a pathway to success that cultivates student's confidence in their own abilities while celebrating the best of what STEM fields have to offer.

Analysis of STEM Focused Schools State-wide

Overall, academically successful STEM schools in Arizona serve students from more affluent, English-speaking families. Of the six "A" rated STEM focused schools statewide, four are in Pima County. The two "A" schools in Maricopa County, Paragon Science Academy and Sonoran Science Academy of Ahwatukee, are not located in the Phoenix metro area. Notably, both of these schools have demographics vastly different from our target area, reporting 25% and 41% of students qualifying for free and reduced lunch respectively compared to 87% in our target area. As shown in Table A.2.5, those STEM schools approaching demographics more comparable to our target area (within Maricopa County and higher percentages of Free and Reduced Lunch) have more mixed results.

Figure A.2.5: Demographics of Arizona STEM Schools

STEM School Name	County	School Type	Free and Reduced Lunch	AZ Learns A-F Rating	ELL	SPED
Academy of Mathematics and Science	Pima	Charter K-8	66%	A	4%	7%
Math and Science Success Academy	Pima	Charter K-6	72%	A	9%	0
Paragon Science Academy	Maricopa	Charter K-10	25%	A	9%	2%
Sonoran Science Academy – Ahwatukee	Maricopa	Charter K-8	41%	A	21%	N/A
Sonoran Science Academy – Davidson Mountain	Pima	Charter 6-10	22%	A	0%	8%
Sonoran Science Academy – Tucson	Pima	Charter K-12	27%	A	2%	5%
Bioscience High School	Maricopa	District	63.5%	B	0%	N/A

[10] Wolfe, N., Besterfield-Sacre, M., & Shuman, L. (2010). Predicting STEM Degree Outcomes Based on Eighth Grade Data and Standard Test Scores. *Journal of Engineering Education,* 99(3), 209-223.

		9-12				
Sonoran Science Academy – Broadway	Pima	Charter K-8	47%	B	6%	9%
Sonoran Science Academy – Phoenix	Maricopa	Charter K-12	71%	B	24%	4%
Arizona Academy of Science and Technology	Maricopa	Charter K-8	38%	C	0%	0%
Booth-Fickett Math/Science Magnet School	Pima	District K-8	59%	C	3%	12%
Sonoran Science Academy – Phoenix Metro	Maricopa	Charter K-8	82%	C	37%	N/A
AVERAGES OF STEM SCHOOLS			51%		10%	5%
AVERAGES OF AREA SCHOOLS			87%		15%	9%

SySTEM Phoenix subscribes to the belief that the quality, not the quantity, of students' learning experiences will have the greatest impact on student achievement. This represents a vast departure from most of Arizona's STEM schools, which simply add more classes within each discipline without distinguishing STEM as an interconnected discipline in its own right. SySTEM's strong commitment to quality over quantity, depth over breadth, and the belief that all students, particularly those in lower-income areas of the Phoenix Metro area , deserve the opportunity to attend a highly performing STEM school will make SySTEM Phoenix a proof point throughout Arizona that dramatic gain in student achievement results from exceptional educational experiences.

B. Meeting the Needs of the Target Population

Several features of SySTEM Phoenix's model directly relate to the community we intend to serve and the challenges we intend to address. To meet the needs of the community, SySTEM Phoenix will use integrated instruction through Problem-Based Learning and a comprehensive Response to Intervention system to ensure all students learn and instill a value for improving the community through STEM innovation to prepare students for success in college and life.

Community Need #1:
A-rated STEM schools serving low-income populations

SySTEM Phoenix believes all students can learn and should be provided with high quality instruction and teachers. It is unacceptable that not one A-rated school exists in downtown Phoenix to provide high-quality STEM instruction to low-income students. Only Bioscience High School comes close as a B-rated school. SySTEM Phoenix believes increased achievement for all students results from rigorous, relevant instruction that integrates subjects through a Problem-Based Learning approach and teaches students how to use scientific values to solve problems in their community.

Community Need #2:
Increased learning time and high expectations for all students to ensure college readiness

To prepare students for college, career, and life, SySTEM Phoenix believes students need high quality learning time and rigorous expectations. SySTEM Phoenix maximizes learning time through an extended school day, in addition to creative scheduling and integration of subjects whenever possible. While every student is held to high expectations, data tracking systems activate multi-tiered intervention systems, which are flexible and individualized to each student. SySTEM Phoenix's comprehensive intervention system runs the gambit from lesson differentiation to small group workshops to extensive one-on-one tutoring and includes the structures necessary to give students multiple opportunities to master content. And the support of a high quality Special Education program. SySTEM Phoenix will explicitly teach 21st Century skills necessary for students to be successful in college, including public speaking and personal finance skills. Writing will be taught across the curriculum to ensure students can present research, make logical and persuasive arguments, and communicate professionally. SySTEM Phoenix will ensure high expectations are communicated and upheld for all students to meet this need.

Community Need #3:
School-Home-Community Connection to build investment in improving community

SySTEM Phoenix believes a small school model is the foundation upon which to build a strong culture and sense of community between families, staff, and other community members. The majority of the families in our target area have working parents (51% of families living in the Phoenix Elementary District have all adults in the labor force). Consequently, as parents are more likely to be working at any given time, parent involvement activities are difficult to schedule. In addition, families in low-income communities often do not know *how* to be engaged in their child's education. Researchers from The Harvard Family Research Project emphasize:

> Families who are traditionally underrepresented in the education system—ethnic minority families, low-income families, and parents who have not attended college—tend to be less familiar with how to access and prepare for higher education.[11]

SySTEM Phoenix addresses this challenge by ensuring all parent engagement activities are scheduled around parents' availability (evenings, etc.). Further, all parent engagement activities focus on student achievement so there is a clear purpose driving parents to be involved. Additionally, partnerships with STEM companies and organizations build relevant connections for students to apply their learning outside of the school environment, resulting in instilling in students a value for improving their communities through STEM innovation.

Table A.2.6: Programmatic Elements Designed to Meet the Needs of Target Population

Community Need	Elements in Program of Instruction

[11] Savitz-Romer, M., & Bouffard, S. M. (2012). *Ready, willing, and able: A developmental approach to college access and success.* Cambridge, MA: Harvard Education Press. Retrieved from: http://www.hfrp.org/family-involvement/publications-resources/helping-families-pave-the-path-to-college-supporting-the-developmental-processes-that-facilitate-college-readiness

A-rated STEM schools serving low-income populations	• Problem-Based learning • Integrated instruction • Focus on scientific values • Structured collaboration and communication • Exceptional teachers with deep content knowledge • Reflective teaching and cognitive coaching
Increased learning time and high expectations for all students to ensure college readiness	• All students, all standards • Comprehensive Response to Intervention • Before/after-school tutoring • Extended school day (8:00-4:00) • High-quality SPED program • Writing across the curriculum
School-Home-Community connection to build investment in improving community	• Small school model • Advisory period • STEM partnerships • Academic Parent Teacher Teams • Partnerships with STAND For Children and American Dream Academy • Students present to authentic community audiences • STEM as a driver for community improvement

C. Class Size and Student-Teacher Ratio

SySTEM Phoenix will maintain a student to teacher ratio of 25:1 or less. Although this is a small ratio, the structure of the day, particularly in high school, will result in some classes having 30 or more students at times to allow for effective student collaboration and maximize time for teacher collaboration. Several reports, including the Arizona Charter Schools Association *Success Measured,* indicate that class size is not a significant factor in student achievement and that many of the benefits claimed by proponents of reduced class sizes (i.e. better attendance rates, lower drop-out rates, improved behavior) can be achieved through strengthening the student-teacher socio-emotional connection.[12]

SySTEM Phoenix will implement structures to increase all students' level of comfort and connection with adult mentors throughout their educational career. For example, teachers will engage with students during an advisory period designed to foster the socio-emotional connection between students and staff. Additionally, SySTEM Phoenix's value for collaboration as a key scientific value that increases students' contributions to the scientific community will provide opportunities for building a deeper student-teacher connection. Ultimately, SySTEM Phoenix will utilize the benefits of a small school model to strengthen the socio-emotional connection between teachers and students, thus increasing students' investment and engagement in their educational experience.

[12] Arizona Charter Schools Association. *Success Measured: Four Foundational Elements of Student-Level Growth.* Retrieved from: www.azcharters.org/docs/successmeasured.pdf