A.1 Educational Philosophy

Mission Statement:
Highland Prep is a Science, Technology, Engineering, and Math (STEM) college-preparatory high school. Highland Prep features a rigorous academic program with an emphasis on 21st century preparation defined by critical thinking and inquiry learning. Highland Prep believes in tying course content to interrelated themes to increases relevance and application in the interest of preparing students to succeed in the future global arena.

Vision:
Highland Prep will create opportunities for students and families to develop critical thinking skills that will ensure that they become successful members of an increasingly innovation-driven society and global marketplace.

A. Philosophical Approach

Highland Prep's philosophical approach to improving student achievement in Buckeye is founded on the belief that:

1. Students must develop critical thinking skills and become college ready in order to succeed in the global marketplace.
2. Exposing our students to Science, Technology, Engineering, and Math (STEM) and Advanced Placement (AP) programming will increase their college and career readiness.
3. Personalizing education for each student and providing high quality formative instruction and assessment will lead to higher growth and greater academic success for our students.

1. Students must develop critical thinking skills and become college ready in order to succeed in the global marketplace.

Highland Prep believes that creativity, innovation, thinking, problem solving, communication, and collaboration are key skills that will characterize students who are prepared for the 21st century (Ontario Principals Council, 2009). Highland Prep also believes that preparing young adults to develop critical thinking skills will better ensure that they become successful members of an increasingly innovation-driven society and global marketplace. Highland Prep believes that college and career readiness, are two of the most important determinants of a school's success. College and career readiness may be measured by a school's ability to transition its graduates to postsecondary education without remediation (Bray, Green, & Kay, 2010). Yet, very few K–12 schools can meet this goal for all students today. "Most schools have neither the expectations nor the measures, neither the instructional programs nor the learning environments, to equip students with the knowledge and skills they need to compete and succeed in a global economy" (Bray, Green, & Kay, 2010).

Highland Prep is committed to the belief that all of its students must attain college readiness. Highland Prep will measure its college readiness by the rigor of its academic program, and by the percentage of students who:

- participate in Honors classes
- participate in the Advanced Placement Curriculum
- meet 4-year college prerequisites

- enter college
- complete a college degree

2. Exposing students to Science, Technology, Engineering, and Math (STEM) and the Advanced Placement (AP) Curriculum will Increase their College and Career Readiness.

Highland Prep will establish a comprehensive STEM program since only a small fraction of Arizona college graduates, 8.9% enter STEM fields. Further, only 23.3% of Arizona students who enter and graduate from STEM programs in college are minority (U.S. Dept. of Education, 2011). Highland Prep's target area: 85323, 85353, 85392, 85395, and 85338 has a minority index that is higher than the state average at 77% compared with 43.2 statewide (factfinder.census.gov). Therefore, the need for a quality STEM high school program in the community is especially acute.

The achievement gap between U.S. students and foreign students has been defined by the number of students pursuing degrees in math, science, engineering, and technology. According to the findings in the 2005 National Academies report, titled *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, in South Korea 38% of all undergraduates receive their degrees in natural science or engineering. In France, the figure is 47%, in China, 50%, and in Singapore, 67%. In the U.S., the corresponding figure is 15%. Some 34% of doctoral degrees in natural sciences, and 56% of engineering PhDs in the U.S. are awarded to foreign-born students (National Academies, 2009). A recent U.S. Department of Commerce report projected that in the decade leading up to 2018, STEM occupations will grow by 17%, compared with 9.8 percent growth for all other occupations. Further, across the nation, there are reportedly 3.6 people for every one job; whereas, in STEM fields, there is one person for every 1.9 jobs (U.S. Dept. of Commerce, 2011). In light of this achievement gap in American students entering STEM fields, and the apparent future need; a high quality STEM college preparatory school will provide the local community with an opportunity for their children to prepare and qualify for such programs and career paths and ultimately a bright future. Highland Prep will offer a comprehensive STEM program that will expose its students to collaborative projects that reflect current and future college and workplace dynamics.

Another important challenge for America's students is the need to develop the ability to apply their knowledge efficiently, to think critically, analyze, synthesize and make inferences (Gijbels & Dochy, 2006). Highland Prep believes that the best way to ensure that their students acquire these skills will be through exposure to a rigorous curriculum. Highland Prep's rigorous curriculum will include honors and AP (advanced placement) classes since students who participate in the AP curriculum have increased high school graduation and college completion rates (College Board, 2007) over those who do not. In fact, In a study commissioned by the College Board, University of Texas researchers Linda L. Hargrove and Barbara Dodd, along with Texas Higher Education Coordinating Board researcher Donn Godin compared students who graduated from high school from 1998 to 2002 and enrolled at public colleges and universities in Texas, provided strong support for Advanced Placement (AP) benefits over non-AP experiences for students and their subsequent GPA, credits earned and graduation performance (College Board, 2007).

In the study, students were compared who took at least one AP course and the associated exam, those who took an AP course but elected not to take the test, and those who didn't take any AP classes at all. To control for other factors that could affect college outcomes, the study only compared students who had similar SAT scores and similar participation status in the national school lunch program, which is used in public schools for Title I program funding based on poverty guidelines. The study found that forty percent of students who graduated from high school in 2001 and who took the AP English

Language and Composition course and exam in high school completed college in four years (College Board, 2007). While twenty-five percent of students who took only that AP course graduated within that time frame, only twenty percent of students who took a standard high school curriculum finished in that time frame (College Board, 2007). Overall, students who take AP courses in high school were found to be more likely to graduate from college within four years and have higher grade point averages in college than similar students who are not exposed to such classes (College Board, 2007).

Even more important were the implications of taking rigorous coursework in high school on high school graduation rates. In the same College Board study (2007), it was found that students who took an AP class had a 40% greater likelihood of graduating from high school. Even if a student was found to have failed an AP class, he or she was found to have a 25% greater likelihood of finishing a college degree due to the exposure to college-level rigor. Highland Prep believes that the implications are clear; opportunities increase for students who are exposed to rigorous coursework, through the Advanced Placement curriculum. Highland Prep's administrative team has a demonstrated track record for exposing its students to AP coursework as evidenced by their previous school's recognition by the ADE in ranking 13th in Arizona (2011) for student participation in the AP curriculum. Highland Prep will offer a rigorous pre-AP program for English and Math through Spring Board. Through exposure to this curriculum, students will be prepared, and encouraged to participate in AP coursework.

3. Personalizing education for each student and providing high quality formative instruction and assessment will lead to higher growth and greater academic success for our students.

Highland Prep will ensure that each student participates in the creation of a personalized education plan (PEP) uniquely tailored to his or her own learning needs and goals. Encouraging students to take an active interest in their own education is essential. At least as important, is that true personalization requires that a "learning program and approach [are] specifically tailored to the abilities, interests, preferences, and other needs of the individual student, and that such considerations are driven by individual data at the classroom level (Wolf, 2010).

All new Highland Prep students will participate in an administrator/student/parent intake interview. Prior to the interview each student will be assigned a diagnostic assessment for Reading and Math (ACT Aspire, See A.5) to help the administrative team establish a baseline from which to schedule classes, prescribe remediation, targeted intervention, identify enrichment opportunities, and to measure future (longitudinal) growth. In addition to previous school data, a rubric for each test will assist the administrative team in determining student needs. Where applicable, students may be placed in remedial classes and or, assigned to the *Future Freshmen Academy*, various workshops, tutoring with teachers, or online tutoring. Student test data and transcript analysis also assists in determining enrichment opportunities, which may include honors and advanced placement (AP) classes. Again, through this process, students will be assigned classes based on their academic history, graduation needs, as well as student and parent feedback. The interview process initiates the start of a Personalized Education Plan (PEP). Each student has unique characteristics, strengths and areas in need of remediation and enrichment. Each student's data will be tracked on datasheets that are updated by a specific grade level tracker (Holcomb, 2004). For example, freshmen will be tracked by one faculty member whose responsibility is to ensure that all freshmen are kept on track with their freshmen goals, which are articulated in their four-year graduation plan, which is a part of their PEP (See A.3). Similarly, all sophomores will be tracked by a particular advisor (hereby referred to as Grade Level Advisor, Section A.5), as will upper classmen.

Weekly grades at Highland Prep will be tracked by each advisor and will be accessible to parents via the school's Blackboard Engage (Edline) portal accessed through the school's website (See A.5). Teachers

report students who are missing assignments or doing poorly on tests to administration, via email and administration meets with each student individually, in order to determine a course of action aimed at remediating the situation. When academic challenges arise, it will be standard practice for students to stay after school with a particular teacher that day (See A.4) and in some cases over a period of days until the missing work is completed or weak skill sets are remediated (Ouchi, 2009). These one-on-one meetings are tracked and a disposition is shared with the referring teacher and parents (Johnson, 2002). In one of Highland Prep's administrative team's previous school, the assignment completion rate steadily improved after the aforementioned practice was initiated during the second quarter of the 2008-2009 school year. As a result, the failure rate at the school was reduced by 10% over the following two years. The practice also assists grade level advisors in keeping their students on track with their PEPs (See A.5), which includes their year-long class schedule, as well as protecting each student's G.P.A. and progress towards graduation. Highland Prep's administrative team has found Personalized Education Plans helpful in building efficacy with parents and students by demystifying the learning process and giving parents a reason to support the school with their child's progress (McEwan, 2003).

Formative Instruction and Assessment: Formative instructional and assessment practices have been increasingly viewed as providing information necessary to personalize education for each student, by providing timely information to be used in personalizing instruction (Wolk, 2011). Highland Prep will utilize formative instruction and assessment as its primary instructional vehicle since it has a proven track record for generating significant growth with all students, and particularly with those who struggle or are behind (Black & Wiliam, 1998b, Popham, 2007). It is important to make a distinction between the commonly understood definition of formative assessment as "a process by which "student's results are gathered in time to ensure that instruction is malleable enough to introduce changes" (Scriven, 1967). Based on an extensive review of empirical research studies on classroom assessment, carried out by British researchers Black and Wiliam in 1998, formative assessment gained world-wide attention when it was revealed that when properly executed in the classroom, formative assessment helps students learn what is being taught at a deeper conceptual level. The argument they made was supported with evidence from their meta-analysis in which they concluded that student gains in learning resulting from formative assessment were "amongst the largest ever reported for educational interventions" (Black & Wiliam, 1998, p. 61). Further, that when properly executed in the classroom, formative assessment will help students learn what is being taught to a substantially better degree. (p.61)

Black and Wiliam's meta-analysis was commented on by leading educational experts from several nations. The meta-analysis essentially featured nine years' worth of research reports and used two earlier extensive reviews (Crooks, 1988) as starting points. Black and Wiliam were able to identify 681 publications that seemed significant to their review. From those 681 reports, 250 were used in the final meta-analysis. The studies they considered were diverse in nature: carried out by researchers in several nations, involving students ranging from 5-year-olds to undergraduates, and focused on a variety of subject fields. (Popham, 2008, p. 19) Based on their meta-analysis, Black and Wiliam reported typical effect sizes of between 0.4 and 0.7 in favor of students taught in classrooms where formative assessment was employed. Such effect sizes, the two meta-analysts observe, "are larger than most of those found for other interventions" (Black & Wiliam, 1998b, p. 141).

Formative Assessment Re-defined: Black and Wiliam defined formative assessment as "all those activities undertaken by teachers, and/or by their students, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged" (Black & Wiliam, 1998b) In 2006, Black and Wiliam's meta-analysis prompted the Council of Chief State School Officers (CCSSO) to form a consortium or State Collaborative on Assessment and Student Standards (SCASS) to study formative assessment. This consortium, Formative Assessment for Students and Teachers (FAST), was tasked with defining formative assessment so that educators could understand the practice.

According to Popham (2008), who participated in the consortium; the following definition was adopted, "formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes" (p. 5). What is important about this definition is that formative assessment is not an assessment, or test, it is a planned process that involves a number of different activities (Popham, 2008). These activities use assessments to garner evidence on student performance; the evidence is then used by teachers to adjust their instruction on a minute-by-minute basis. The distinction made is essential in characterizing Highland Prep's instructional approach since, true formative assessment should not be confused with commercially prepared benchmark assessment systems (Black & Wiliam, 1998b, Shepard, 2006).

Highland Prep's students will include significant numbers of low socio-economic status and minority students (See A.2). As mentioned, the academic growth and achievement among similar populations of students who participated in formative instructional and assessment programming has a typical effect size of between 0.4 and 0.7 in favor of students taught in classrooms where formative assessment was employed (Black & Wiliam, 1998b, Clark, 2013). An effect size of 0.7, if it could be achieved on a nationwide scale, would be equivalent to raising the mathematics attainment score of an "average" country like England, New Zealand or the United States into the "top five" after the Pacific Rim countries of Singapore, Korea, Japan and Hong Kong. (p.61). Highland Prep's administrative team has experienced success utilizing these methods at two previous schools, one of which was recognized as one of America's Best High Schools by U.S. News & World Report for 2010, 2011, 2012, and 2013, and the second school in 2014. Each award was based on data from academic particulars from the two previous years (i.e.: 2010 was based on 2008). The primary determinants for the awards were based on student growth measured by poverty and minority indexes.

B. Principles Fundamental to Program of Instruction Including Research and Rationale

College Readiness, STEM and AP Programming: Highland Prep's curriculum program will be dynamic, rigorous and relevant to students who are preparing to compete with students from around the world in a new and increasingly innovative global arena. Highland Prep will ensure that its curriculum and instruction is strategically designed to ensure that each student receives individual attention to their personal goals with innovative pathways. Highland Prep understands that it is the education team's responsibility to prepare students to be creative, adaptive and innovative in their thinking.

As mentioned, Highland Prep will feature a STEM program and that program will be strengthened through the implementation of Literacy Standards. This is especially important for APA's target student population since inadequate reading and writing skills are a proven barrier to successful entry in STEM fields due to the need for remediation before true college work can begin. Highland Prep's STEM program will assist students in preparing for careers in STEM fields by enhancing college preparation, thereby reducing the need for remediation since students who participate in STEM programs in high school are found to earn higher HPAs, have better retention and are better-equipped for the rigors of college study (College Board, 2012).

Highland Prep will integrate its STEM curriculum program through embedded projects. In support of Highland Prep's STEM program, the school will partner with Project Lead the Way (PLTW) in exposing its students to the Science, Technology, Engineering, and Mathematics (STEM) curriculum. The PLTW program engages students in activities, projects, and problem-based learning (See A.3), which provides hands-on classroom experiences. HIGHLAND PREP's students will create, design, build, discover, collaborate and solve problems while applying what they learn in math and science (See A.3.2). They will

also be exposed to STEM fields through professionals from local industries who supplement the real-world aspect of the curriculum through mentorships and workplace experiences.

The PLTW curriculum is founded in the fundamental problem-solving and critical-thinking skills taught in traditional career and technical education along with national academic and technical learning standards and STEM principles, creating what U.S. Secretary of Education Arne Duncan calls one of the "great models of the new CTE succeeding all across the country." PLTW was recently cited by the Harvard Graduate School of Education as a "model for 21st century career and technical education."

• PLTW alumni are studying engineering and technology at five to ten times the average rate of all students.
• PLTW students have a higher retention rate in college engineering, science, and related programs than other students in those areas.
• 97% of PLTW seniors intend to pursue a four-year degree or higher, whereas the national average is 67%.
• 80% of PLTW seniors say they will study engineering, technology, or computer science in college, whereas the national average is 32%.
• PLTW students achieve significantly higher scores in reading, mathematics, and science than Career and Technical Education (CTE) students in the same schools in similar CTE fields.

In the first year, Highland Prep will feature Introduction to Engineering (IE), which explores the design process and links STEM principles to relevant problem-solving activities (See A.3.2). PTE courses complement traditional mathematics and science courses and can serve as the foundation for STEM-centered or specialized academies. PTE is designed to prepare students to pursue post-secondary education and careers in STEM-related fields. Additionally, the fischertechnik STEM Lab Program will be utilized to integrate project-based learning with Arizona's College and Career Ready Standards. The program will promote hands-on exploration, inquiry design, and problem solving. Each level consists of various theme projects that enable students to explore and understand science technology, engineering, and mathematics concept areas. Additionally, the program meets AZCCRS, and the National Science Education Standards, and standards of ISTE, and ITEEA. In year 2, Highland Prep will add Principals of Engineering (POE), and in year 3 Civil Engineering & Architecture (CEA) as well as Aerospace Engineering (AE).

Highland Prep will also feature several Robotics programs, which include: SeaPerch, Vex, and Zero Robotics sponsored by NASA & MIT. Highland Prep's administrative team has experience with establishing each of the aforementioned robotics programs having implemented each program at their two most recent schools. The Highland Prep administrative team also has a three-year relationship with Project Lead the Way (PLTW), again through implementation of the program at their two most recent schools, and with the Madison Elementary School District.

Framework for Data-driven, Personalized Education Utilizing Formative Assessment: Highland Prep will use data to drive daily instructional practices in the classroom as well as with targeted remediation. Students in the bottom quartile will be immediately identified through a diagnostic assessment for Reading and Math (ACT Aspire) which will help the administrative team establish a baseline from which to schedule classes, prescribe remediation, targeted intervention, identify enrichment opportunities, and to measure future (longitudinal) growth (See A.5). The assessment will be used in conjunction with previous school data to assist the education team in preparing a specific course of interventions for each student commensurate with their unique educational needs.

In the interest of examining each student's overall learning patterns, remedial and enrichment needs, Highland Prep will implement personalized education plans (PEPs) for each and every student. Further, such plans will be actionable documents that provide important feedback and support to guide student success and to ensure that each student, his/her parents, and each teacher has timely information that will be used to guide important decisions. Such decisions may include the need for one-one-one tutoring, workshops, remedial classes, honors classes, and AP readiness. During *Future Freshmen Academy*, which will occur over the summer prior to the start of the school year, students will articulate short, medium and long-range goals (See A.2, and A.5). They will identify processes by which they will accomplish these goals, and these plans will be reviewed by a member of the faculty (grade level advisor, See A.5). Personalized education, and personalized education plans have a proven track record of ensuring student success (Wolf, 2010 & NASSP, 2004). Schools that implement Personalized Education Plans use data to look at the big picture for the school in terms of the overall success of its academic programs. Such schools fine-tune their programs, student schedules, and targeted remediation regularly. Schools with such programs often prescribe interventions and remediation daily, on a student-by-student basis, to ensure that disruptions to learning success are treated in a timely fashion. Highland Prep's administrative team has over a decade of experience with using PEPs to maximize individual student improvement (See A.3).

Highland Prep's education team will be trained in the use of analytics, and how to access and make use of individual student data. Highland Prep will give two benchmark assessments each year in order to determine longitudinal growth and to illuminate areas particular to each student for purposes of remediation. The benchmark assessments will also be used to assist the education team in making adjustments to classes, workshops, and intervention programs, by examining areas of common weakness through concept and strand analysis. Thus, data at both the school and classroom level will be used to identify opportunities for both remediation and enrichment (Clark, 2013).

The rationale for using a data-driven, personalized instructional program that makes extensive use of formative assessment has already been made. As mentioned, Highland Prep's administrative team has extensive experience in personalizing education and using formative assessment instructional practices to promote significant growth and academic success with their students. Extensive research supports the effectiveness of personalizing education and using formative instructional practices. Black and Wiliam's 1998 meta-analysis provided compelling evidence of its effectiveness. Reported effect sizes of between 0.4 and 0.7 in favor of students taught in classrooms where formative assessment was employed can hardly be ignored (Black & Wiliam, 1998b, p. 141). Yet, the most important reason that Highland Prep's instructional program is highly appropriate to its target population is that the bulk of studies indicate that "improved formative assessment helps low achievers even more than other students – and so reduces the range of achievement while raising the achievement overall" (Black & Wiliam, 1998b, p. 141). Highland Prep's administrative team believes in equity, and equity is best defined as not treating everyone the same but rather, getting everyone to the same place, irrespective of the condition upon which they arrived.

As mentioned, Highland Prep's administrative team, used formative assessment instructional practices to generate significant academic growth, as measured by student growth percentiles (SGP's) from students who arrived to their previous schools as low achievers. A 2013 research study compared their former school (treatment school) with ten comparison schools from the same geographic locale, serving similar student populations, utilizing non-formative assessment practices. The results of the study revealed that treatment school students had significantly higher math SGPs than comparison students ($p < .001$, Cohen's $d = .73$), as well as significantly higher reading SGPs ($p = .019$, Cohen's $d = .33$). The effect sizes of d = .73 and d = .33 indicate that treatment school students on average had math SGPs that were .73 standard deviations higher than comparison students, and reading SGPs that were .33

standard deviations higher than comparison students (Clark, 2013). These effect sizes can be considered large and medium, respectively (Cohen, 1988).

The implementation of formative instruction and assessment in each classroom is the key determinant of a successful data-driven, personalized education program since the degree to which a student learns and retains conceptual knowledge happens primarily in the classroom and will ultimately determine their level of academic success. Highland Prep will use formative instruction and assessment to guide student success. Highland Prep will continuously fine-tune its programs, student schedules, and targeted remediation every nine weeks. Highland Prep will prescribe interventions and remediation on a student-by-student basis, daily to ensure that disruptions to learning success are treated in a timely manner. The overall formulation of these ingredients has been proven to generate growth and academic achievement for similar target populations and Highland Prep will ensure that these ingredients are implemented with fidelity from the beginning of the first day of school and thereafter.

Exceptional Teachers: Highland Prep believes that exemplary student growth and academic achievement is heavily dependent on a quality of the education team. The education team must be developed and supported in order to promote excellence in teaching and academic programming (C.3). Highland Prep believes that the education team must engage in professional development that leads to continuous improvement. It is essential that the education team exemplify the traits that they wish to see developed in their students. As a result, the school's education team will participate in ongoing professional development in the use of formative instruction and assessment practices (See A.5). Highland Prep's education team will be trained in formative instruction and assessment through James Popham's Transformative Assessment (Popham, 2008) professional development program. Teachers will receive this training through a professional learning community (PLC) format over a 3-year period.

In year 1, teachers will read Popham's book, and begin experimenting with the teaching practice in a Concerns Based Adoption Model (CBAM) format (Hall & Hord, 2001). In year 2, teachers will be expected to have implemented the practice in any direct instruction portion of their classes, with guidance and feedback from the school's curriculum coach. Finally, in year 3, teachers who have participated in the program the two previous years will be evaluated on the quality of their formative assessment instruction. Teachers who use formative assessment effectively will become increasingly effective and once they've developed their acumen for the instructional innovation – exceptional.

Teacher Improvement and Evaluation System: Highland Prep's education team will be trained on the *Charlotte Danielson Framework for Teaching* which is the model selected to guide teacher and administrator development and evaluation (See A.5). The Framework for Teaching is based on the premise that all students "acquire deep and flexible understanding of complex content, to be able to formulate and test hypothesis, to analyze information, and to be able to relate one part of their learning to another (Danielson, 2012)." The Framework for Teaching is consistent with the aims of the Common Core curriculum, where students learn how to acquire and apply their knowledge efficiently, to think critically, analyze, synthesize and make inferences, based on a deeper conceptual understanding of the curriculum. The model was also chosen since it also incorporates formative teaching, learning and assessment practices (Danielson, 2012).

The *Charlotte Danielson's Framework for Teaching* model has four domains: *Planning and Preparation*, *The Classroom Environment*, *Instruction*, and *Professional Responsibilities*. The *Framework for Teaching* model will be implemented during the summer in-service prior to the start of the inaugural school year, and will remain in place thereafter to ensure that the school evolves and improves its instructional effectiveness.

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