

BMSA AdvancED STEM Certification

Executive Summary

Prompt #1: Provide examples of how the STEM educators and facilitators implement and sustain the core tenants of an effective and age appropriate STEM curriculum.

Barbara Morgan S.T.E.M. Academy (BMSA) is a K-5 public school of choice located in the West Ada School District in Meridian, Idaho. BMSA was created by the West Ada School Board of Trustees in 2013 with the goal of increasing student literacy in the areas of Science, Technology, Engineering and Math by embracing the core tenants of an effective and age appropriate STEM curriculum.

One tenant of an effective STEM curriculum is providing learning opportunities for a diverse group of learners. BMSA serves as the STEM magnet program for the west central region of our District and serves a diverse population that is representative of our community. Although students and families apply to our Academy based on an interest in STEM education, District and School leadership have taken intentional steps to ensure BMSA serves a diverse population that is representative of our community. We have done this by implementing and promoting a non-biased lottery application process open to all learners and by locating our District’s regional English Language Learners magnet program at our Academy. Our school currently serves 462 students in grades K-5. Our student population consists of 54% boys and 46% girls, 30% qualify for free or reduced lunch, and 23% of our students represent minority ethnicities. We advertise our Academy District wide and offer monthly tours to any and all interested families. We believe our efforts to reach diverse populations have proven effective.

| Grade Level | Total in Grade | 01 American Indian or Alaska Native | 02 Asian | 03 Black or African American | 04 Native Hawaiian / Other Pac Islander | 05 White | Hispanic/Latino | Two or More Race Categories | Unspecified |
|-------------|------------------|-------------------------------------|------------|------------------------------|---|------------------|-----------------|-----------------------------|-------------|
| 0 | 72 44 / 28 | 1 1 / 0 | 0 0 / 0 | 2 1 / 1 | 0 0 / 0 | 49 31 / 18 | 18 10 / 8 | 2 1 / 1 | 0 0 / 0 |
| 1 | 72 39 / 33 | 0 0 / 0 | 2 0 / 2 | 2 1 / 1 | 0 0 / 0 | 60 32 / 28 | 5 4 / 1 | 3 2 / 1 | 0 0 / 0 |
| 2 | 75 41 / 34 | 0 0 / 0 | 0 0 / 0 | 1 0 / 1 | 0 0 / 0 | 59 35 / 24 | 12 4 / 8 | 1 0 / 1 | 2 2 / 0 |
| 3 | 76 33 / 43 | 0 0 / 0 | 1 0 / 1 | 2 0 / 2 | 0 0 / 0 | 59 25 / 34 | 10 6 / 4 | 4 2 / 2 | 0 0 / 0 |
| 4 | 84 43 / 41 | 1 0 / 1 | 0 0 / 0 | 1 0 / 1 | 0 0 / 0 | 60 34 / 26 | 19 9 / 10 | 3 0 / 3 | 0 0 / 0 |
| 5 | 83 49 / 34 | 0 0 / 0 | 2 1 / 1 | 2 2 / 0 | 0 0 / 0 | 69 37 / 32 | 7 6 / 1 | 3 3 / 0 | 0 0 / 0 |
| Total | 462 249 / 213 | 2 1 / 1 | 5 1 / 4 | 10 4 / 6 | 0 0 / 0 | 356 194 / 162 | 71 39 / 32 | 16 8 / 8 | 2 2 / 0 |

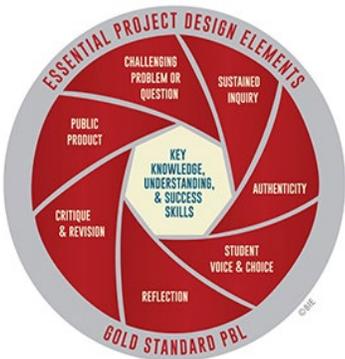
The Federal Ethnicity and Race view displays aggregate student data as required by the Federal Ethnicity and Race Categories from the U.S. Department of Education. See the help for more information.

Additional tenants of an effective STEM curriculum is providing opportunities for students to work both independently and collaboratively in an integrated, inquiry environment that empowers students to pool from a range of content area knowledge and skill to communicate their learning through authentic performance tasks. We accomplish these tenants in a variety of ways including, but not limited to, embracing a school-wide approach to inquiry learning called the W.I.S.E Way and developing common grade level authentic Project Based Learning activities.

Our mission at BMSA is to develop life-long learners working together as innovative problem-solvers in a global community. A definition of a life-long learner is one that maintains a curiosity about the world around them and is equipped with the knowledge and skills necessary to seek answers to their questions. At BMSA we foster inquiry and life-long learning through a process we call the “W.I.S.E Way.” Through the W.I.S.E Way, students learn to “Wonder” about the world around them by honing their observation and questioning skills. Students then “Investigate” their questions through employing sound research practices and utilizing the scientific method and engineering design process to gain insight into their question or wonder. Students then “Share” what they have learned by communicating their findings with their community or real-world audience. Finally, they “Extend” the learning by applying their new- found knowledge in a way that answers the question, solves the problem or facilitates that next step of the learning process. All students at BMSA learn the W.I.S.E Way in Kindergarten and continue to use this process throughout their entire elementary career. The W.I.S.E Way is a central component to all teacher’s instruction in all grade levels. Each morning the Principal selects one student’s wonder question to read on the announcements and challenges the entire student body to “Investigate” the answer and “Share” what they learn with the Principal. The Principal “Extends” that learning by sharing this information with the entire school population the following morning on the announcements.



We accomplish the second aspect of our mission of working together as innovative problem solvers in a global community through the process of Project Based Learning (PBL). Project Based Learning involves selecting an authentic question or problem and pooling from a wide range of content area knowledge and skill to solve that problem and share findings with a target audience . According to the Buck Institute for Education, Quality PBL’s embrace the following components: A challenging question or problem, sustained inquiry, authenticity, student voice and choice, opportunities for reflection, critique and revision, and a public product. (1). At BMSA we have developed a common planning template that enables all teams K-5 to plan high quality PBL’s by taking these critical components into consideration when planning their PBL units. Our planning template facilitates the integration of multiple content areas and allows our teachers to teach up to 70% of their math, ELA, Science and Social Studies standards in an integrated nature through our PBL’s. Some examples of our PBL’s include 2nd graders designing innovative solutions to enable athletes with disabilities to perform at higher levels in their winter Olympic sport and 5th graders utilizing locally sources materials to design water filters in 3rd world countries.



In addition to embracing the critical components of PBL’s, our PBL planning document also embraces STEM literacy necessary for the next level of STEM learning and for post-secondary and workforce readiness. When planning PBL’s, our teachers are required to reflect on what careers and professions deal with the topic at hand. Teachers generate a list of pertinent professions and then reach out to professionals in those areas and invite them to be a guest speaker during the investigation portion of the students’ PBL research. We host dozens and dozens of guest speakers each year and ask each one of our guests to share what they do, how it relates to what

the students are studying and what knowledge and skill they had to acquire to do what they do for a living. Our students have many opportunities over their six years with us to explore many different STEM careers and learn the knowledge and skill necessary to be successful in those fields.

In addition to this, BMSA and our entire District systematically teaches Connelly’s four pillars of college and career readiness: Think – Key Cognitive Strategies, ACT – Key Learning Skills and Techniques, KNOW – Key Content Knowledge, and GO – Key Transition Knowledge and Skill. These four critical aspects of College and Career Readiness are a central part of our District’s instructional model. Inviting guest speakers into our classrooms to serve as experts on the content knowledge and skill our students are working on to complete the PBL is one of several ways we create ties with our families, community, post-secondary, and business and industry partners. In several cases we tap into our own parents that work in STEM fields to come and share what they do with our students.



Another way we connect with our families, community, post-secondary schools and industry is through our annual Family Engineering Nights. We kick off each year with a fun, family engineering night that has a specific theme and challenge. At each of these events we partner with local government, universities and industry to help bring awareness and authenticity regarding the engineering theme. Recent examples of our Family Engineering Night would be, “Come Fly with Us.” At this event families were challenged with engineering a craft capable of flight. We partnered with the Army National Guard and had their helicopter pilots land a helicopter in our field and then provided families the opportunity to tour the aircraft and visit with the pilots. We also partnered with industry by having our local hospital, St. Lukes and had their LifeFlight paramedic crew on site to answer questions about how they use helicopters to save lives. Families had the opportunity to investigate flight by engineering a flying device and re-engineering it to increase its flight time and distance.





Finally, in addition to our students being supported in their STEM learning through adult-world connections via their PBL guest speakers and Family Engineering nights, students also have the opportunity for extended day opportunities that enrich their experience with STEM. BMSA offers a wide range of after school clubs that provide students the opportunity to dig deeper into particular STEM topics of interest. Current after school STEM clubs include: Coder's Club where K-5 students learn to write computer code, Technology Club where students learn IT support skills and

video production skills, Engineering Club where students learn the engineering design process, Robotics Club where students build and program robots to perform specific tasks, and Chess Club where students learn strategy and critical thinking. We also have a myriad of clubs that reinforce the soft skills necessary for success in STEM careers such as working together, writing and leading others.

This executive summary is merely an overview and provides just the tip of the iceberg in regards to how our teachers at BMSA implement and sustain the core tenants of an effective and age appropriate STEM curriculum. Upon investigating the evidence for each of the 11 standards comprising the STEM certification, one will learn many more ways in which BMSA embodies these STEM standards of effective STEM learning.

Prompt #2: *Provide a general description of the learning experiences in which the STEM students were most successful. Additionally, generally describe the learning experiences that need improvement for greater student success.*

We are proud of the extent to which we have been able to embrace the 11 STEM standards outlined in AdvancEd's STEM certification in our six years of existence as a STEM Academy. Despite our accomplishments, we embrace a growth mindset and continually reflect on our practice and seek ways to improve in each of these standards. In reviewing the 11 standards we feel we are most successful with standards: 1,2,3,4,5,6,7,8, and 11. (See standards below for reference) These standards largely embrace our ability to deliver quality integrated, authentic, real-world instruction through the vehicle of Project Based Learning, as well as, partnering with our community to provide students opportunities for STEM enrichment and college and career readiness. We believe that our collaborative planning process embraces the core tenants of an effective STEM curriculum and in the previous prompt, we articulated our PBL planning process and gave multiple examples of our PBL units and how they address the standards in an effective manner.

Specific standards that we would like to grow in would include standards 9 and 10. Standard 9 speaks to STEM teachers and leaders participating in a continuous program of STEM specific professional learning. Our staff has participated in a great deal of STEM specific professional learning (see evidence for standard 9), but we've found local expertise in STEM education to be somewhat sparse. PD time and budget limitations make it challenging for us to pursue quality STEM professional development. We are seeking to mitigate these challenges by working with Idaho's STEM Action Center to pool resources that will enable us to partake in more STEM specific PD. Our principal is currently on a State Board Committee that is working with the STEM Action Center to provide more quality opportunities for STEM education throughout the State. We have multiple staff members that have partnered with Boise State University to partake in STEM specific PD and then go out and train others with what they have learned. One of our teachers is currently employed by the Idaho State Dept. of Education to provide training on STEM teaching throughout the entire State. Other Staff members frequently present

STEM PD at local and regional conferences and workshops. We believe that our efforts to continue to network with entities knowledgeable in STEM learning will help us continue to improve as a STEM Academy.

The second standard we seek to improve in is standard 10, which speaks to partnering with community, post-secondary and industry to engage students and teachers in the STEM program. Although we do many things at BMSA to connect with these entities (see evidence for standard 10), we would like to create a more formalized and sustainable relationship by creating an advisory board with each of these entities represented. The plan would be to have this advisory board convene a couple times a year to discuss ways that we can more intentionally partner in our efforts to educate children in AdvancEd's 11 STEM standards with the hopes of producing students that are more college and STEM career ready. We also believe that formalizing these relationships with each of these entities will better leverage each of our resources to better help one another in our individual goals and pursuits. We have existing relationships with individuals in each of these entities and believe that formalizing these relationships through the formation of an advisory board is realistic and achievable. Our intent would be to reach out to these entities this year and begin meeting as an advisory board next year.

Core Tenants: (Summary of AdvancEd's 11 STEM Standards)

1. The STEM school supports non-traditional student participation through outreach to groups often underrepresented in STEM program areas.
2. Students work independently and collaboratively in an inquiry -based learning environment that encourages finding creative solutions to authentic and complex problems.
3. Students are empowered to personalize and self-direct their STEM learning experiences supported by STEM educators who facilitate their learning.
4. Students use technology resources to conduct research, demonstrate creative and critical thinking, and communicate and work collaboratively.
5. Students demonstrate their learning through performance-based assessments and express their conclusions through elaborated explanations of their thinking.
6. The interdisciplinary problem based curriculum includes a focus on real-world applications.
7. STEM educators collaborate as an interdisciplinary team to plan, implement, and improve integrated STEM learning experiences.
8. STEM learning outcomes demonstrate students' STEM literacy necessary for the next level of STEM learning and for post-secondary and workforce readiness.
9. STEM teachers and leaders participate in a continuous program of STEM specific professional learning.
10. Community, post-secondary, and business/industry partners and /or families actively support and are engaged with teachers and students in the STEM program.
11. Students are supported in their STEM learning through adult-world connections and extended learning opportunities.

(1) Gold Standard PBL: Essential Project Design Elements

Adapted from Setting the Standard for Project Based Learning: A Proven Approach to Rigorous Classroom Instruction, by John Larmer, John Mergendoller, Suzie Boss (ASCD 2015)