

Monitoring of Fundamental 4
February 11, 2016

Fundamental 4: Encourage and enable students to be academic entrepreneurs and risk-takers who can choose to pursue academic passions and interests beyond traditional curriculum and beyond the traditional classroom environment.

This is the second full governance monitoring of Fundamental 4. The board approved the Superintendent's Interpretation of Fundamental 4 on January 16, 2014. The first monitoring of Fundamental 4 occurred on February 24, 2015. This report used the Mixed Method Assessment, noting both qualitative and quantitative indicators of measurement.

The leadership team used the Superintendent's Interpretation of Fundamental 4 to prepare the following monitoring report and is organized into the same themes as described in the Interpretation.

QUANTITATIVE INDICATORS

Numerous quantitative factors from the Asset Survey and the Educational Effectiveness Survey (EES) were considered and the following indicators were selected for Fundamental 4. Students will participate in the next Asset Survey during the spring of 2016. The EES is administered each year between February and March; results are usually available to the school district in May.

		SY 10-11	SY 11-12	SY 12-13	SY 13-14	SY 14-15
Developmental Asset Survey Results – given to MIHS students in alternate years	Total number of Developmental Assets (40 possible) report by MIHS students		21.7		21.1	
	% of students reporting the Asset of “Youth Programs”		81		80	
Educational Effectiveness Survey Results – given to student in grades 4 through 12	% of students who agree “My teacher(s) provide lessons and activities that challenge me to learn”	74	75	77	79	77
	% of students who agree “My teacher(s) listen to my ideas and/or concerns”			69	72	70
	% of students who agree “My teacher(s) help us learn in more ways than just talking in front of the class”			66	69	70
	% of students who agree “Work I do in this school is useful and interesting to me”	49	47	49	48	51
	% of students who agree “My teacher(s) help me learn by challenging me with interesting activities in class”			55	57	60

	% of students who agree “My teacher(s) find other ways for me to learn things I find difficult”	52	53	56	57	58
	% of students who agree “Setbacks don’t discourage me”				68	67
	% of students who agree “I try things even if I might fail”				76	74
	% of students who agree “I like to imagine new ways to do things”				77	76

One striking indicator shows that 80% of our High School students “spend three or more hours per week in sports, clubs, or organizations at school and/or in community organizations.” While we know that does not indicate exactly how many students participate in clubs at schools, it is an indication that students are involved in activities that are of interest to them and potentially they have passion around. This spring our students will complete the asset survey and new data will be ready for next year.

These data also show that students perceive their teachers provide lessons and activities that challenge them, are more than just “talking in front of the class”, and provide ways to learn difficult ideas. Students see themselves as creative and are willing to try new things, even at the risk of failure.

QUALITATIVE INDICATORS:

The following qualitative data provide snapshots into Fundamental 4 – Encourage and enable students to be academic entrepreneurs and risk-takers who can choose to pursue academic passions and interests beyond traditional curriculum and beyond the traditional classroom environment. The Fundamental has been divided into three themes:

- Theme 1: Academic entrepreneurs and risk-takers
- Theme 2: Pursue academic passions and interests
- Theme 3: Beyond traditional curriculum and beyond the traditional classroom environment

Several, but not all, will be highlighted at the February 11, 2016 board meeting.

Theme 1: Academic entrepreneurs and risk-takers

IP Second Grade Marketplace - Marketplace is a simulation-based opportunity for students to apply the concepts they have learned in several subjects including social studies, writing and math. Using their understanding of producers/consumers, goods/services, supply/demand, wants/needs and raw/capital materials, students decide what they could create at school that would be a success in the classroom marketplace. Using math skills such as graphing and surveying, students determine whether or not there is a demand for the products they design. They decide on an initial price for their creations, create advertisements (persuasive writing) and maintain accounting ledgers to document sales. Participants take turns being bankers as play money is exchanged and worker paid wages.

Highly Capable Marketplace and Merchants with a Cause - Students in the highly capable program study and apply economics in a simulation-based activity called *Marketplace*. The students learn about supply and demand and how entrepreneurs need to be able to respond to a changing market environment. The students come up with their own ideas for products or services to sell. They have a few program restraints that they have to take into account. Once they have come up with an idea, then they complete a business plan for teacher approval. When the product or service has been approved, they work at home to create the product. They are also encouraged to package and/or market the product in a creative and

engaging manner. A live *Marketplace* is then held in the classrooms, with parents, students, and staff acting as consumers. Data is collected after each marketplace, and the students discuss the shopping trends observed. Each student is free to use this information as he/she prepares a product for the next marketplace.

There is another simulation called *Merchants with a Cause*. Students identify a cause they care deeply about. They investigate an organization (with support of family) that they will further research. Students create a product that will in essence raise money for that cause. Visitors to the event will be asked to make a voluntary donation to the event and all proceeds will be divided and sent to the organizations.

Giraffe Club - Each year, second grade students are asked to participate in the "Giraffe Club." The second grade teachers encourage students to learn to "stick their neck out" to help try to solve a problem or support a cause in their community. The students are exposed to biographies of famous Americans who made a difference as a part of the social studies curriculum. Through that learning, students then determine something that they can do to make a difference. Projects have included cleaning up garbage in a local park, collecting books or supplies for local organizations, or making money to donate to a specific cause. The students then share out their project through an oral presentation to their class.

Online Publishing - In fourth grade, students are empowered to take ownership of their learning and pride in what they do. Students are encouraged to be the *drivers* in making decisions that show their independence and application of concepts and skills taught in class. For the past few years, fourth grade students create Weebly webpages. These are personal student webpages that students build step-by-step, including various pages that are linked off of their home page. Some of the pages include an "About Me" or "Interests" page, "School Work" page, a "Book Reviews" and often a page that includes their own personal "Blog" or "Surveys" for others to complete. On their "School Work" page, students are able to share their learning projects and writing pieces with a greater audience, often sharing the link with family members and friends who don't live near. Students not only learn more about website design and appropriate digital citizenship, but they also take pride in finding ways to showcase their growth as students and individuals and taking risks in presenting their work to a wider audience. Students enjoy the process of personalization involved in creating their Weebly webpage. This project is an evolving *work in progress*, and one in which students can demonstrate perseverance and the opportunity to push themselves in ways they hadn't imagined before.

Science Projects Options - Many science projects at IMS give students the opportunity to be academic entrepreneurs and risk-takers in creatively representing their ideas and/or making their work public. For example, the Google Science Fair initially resembles the Independent Research Project described below. However, student experiments must test a solution to a problem, showcase the experiment and its results in a two minute video, and (with parent support) be submitted online to an external panel of judges.

In another project, student were given the option to: "Use a creative format to capture and communicate the relevance of new life forms, extinct life forms, and major geologic events of one specific time period," some students wrote, composed, and performed their own pieces of music. On a different assignment when given the option to research earthquakes or other catastrophic events, some students commit to long-term writing, editing, and publishing of blog entries. In an authentic way, they learn as much about writing for an audience and maintaining a theme between entries as they learn about the topic of earthquakes.

Artificial Neural Networks in AP Biology - Students in AP Biology have assembled an Artificial Neural Network (ANN). ANNs belong to a branch of Artificial Intelligence (AI) which seeks to create computers capable of learning by simulating how biological brains work. The thought is that brains have evolved to be excellent at learning new things, so why reinvent the wheel? Brains are especially good at recognizing patterns, such as faces in a crowd, which is something that has proven notoriously difficult to teach computers to do using traditional computer programming techniques. In a living organism, neurons are the cells which process information in the brain. Each living neuron constantly receives signals from hundreds or thousands of other neurons. Some signals are excitatory, pushing the neuron to "fire" and generate its

own signal which sends on to other nerve cells in the brain. Some signals are inhibitory, preventing the cell from firing. All these incoming signals add together and will either make the neuron fire or not. The collection of cells that are firing at any given moment in our brains cause our thoughts, memories, feelings and actions! Our ANN simulates this activity using microcontrollers called Arduinos to simulate neurons. Each simulated neuron receives signals from other neurons and adds up all the incoming signals. If the total is larger than the neuron's "threshold", it will "fire" and send a signal to other simulated neurons, otherwise it remains quiet. The ANN is capable of processing information in a manner very similar to the biological neural networks in our brains. Real brains can learn by changing the number and strength of synapses - the structures where one neuron physically communicates with another neuron. Our ANN can simulate this, too, because each input is multiplied by a weight which can be changed, thus changing the likelihood that a simulated neuron will fire. ANNs can be trained to learn to recognize different inputs by presenting the network with Learning Examples which should produce a specific known output by the network. Scientists can adjust the weights that each simulated neuron uses in order to gradually adjust the network's output and correct any mistakes that it makes on the training examples. By presenting each training example hundreds or thousands of times to the ANN, and adjusting each of the many weights by a small amount using statistical techniques, the ANN gradually learns to correctly identify each input pattern. Real ANNs, containing thousands or even tens of thousands of simulated neurons, are capable of learning quite complex tasks, and are currently being employed in face recognition software, Google's self-driving cars, and even in search engines that can sift through the vast amount of data contained in people's search queries. AP Bio's simple ANN will obviously not be capable of such feats, but it will operate using the same basic principles and hopefully help students to develop not only a basic understanding of ANNs, but also a deeper appreciation for how their own brains work!

Civic Action Campaign - The MIHS Social Studies Department collaborated to create a "Civic Action Project" for all students enrolled in the new Civics class to complete. The project requires students to work and think very independently to try to solve a community issue by applying everything that they have learned in class. This project encourages students to take risks and work in the real world with the real world consequences of "failing." The five criteria for the project are: 1) Interact with others in the political system to create change outside of MIHS; 2) Consistent with the educational mission of MISD; 3) Works to contribute an on-going and authentic impact; 4) Scope must be substantial and approved by teacher; 5) Must be verifiable. During the project students are accountable for researching, acting, documenting, and publishing information and results. Additionally, students reflect not only on their learning in the class, but on their impact in the community beyond MIHS.

Theme 2: Pursue academic passions and interests

Elementary Afterschool Clubs - All three Mercer Island Elementary Schools encourage students to pursue their interests through before and after school programs that are sponsored by the PTA or privately sponsored. A wide selection of offerings include: a range of activities from Gardening Club, to art and craft groups; karate; Sponge Language Programs; Lego; running club; rocketry; and many more. Additionally, music programs such as Steel Drum Band, Ukulele Club, Choir, Band and Orchestra allow students the opportunity to select to participate in activities that expand their horizons and allow them to develop new passions.

Elementary Musicals/Operettas/Talent Shows - Each year, all three elementary schools put on several productions and concerts to not only allow the schools to showcase their music programs, but also to allow students to develop their own talents through performances. At Lakeridge, these performances include the 5th Grade Operetta, Veteran's Day Assembly, All School Musical, and three choir and steel drum band concerts. At Island Park the annual 5th grade play and a choral concert by each grade level throughout the year are highlights. At West Mercer, students perform for their peers displaying their musical interests through the Musical or Talent Show, the Drum Club, the Orff Club, and the intermediate choir. Finally, each year the three elementary schools showcase student interests in the Fine Arts Showcase through art and musical performances by students.

Science Fairs - At each of our three elementary schools, we partner with our PTAs to engage students in scientific inquiry, culminating in a community Science Fair. Students are provided with guidelines and information about using the scientific method to ask a question and engage in an experiment in search of an answer. Student participation is voluntary, self-directed, and predominantly occurs outside the school day. Students are encouraged to pursue a question of interest to them, and each year the fairs display a wide range of scientific interests and topics. The science fairs occur in the evening, and students who attend are provided with a note-taking form that encourages them to ask clarifying questions of the presenting scientists and record the learning they gain from exploring the various scientific presentations. Outside agencies with a scientific focus, such as the Pacific Science Center, Issaquah Salmon Hatchery, the Seattle Children's Museum, or the Reptile Man, are often invited to participate in the evening event.

Independent Research Project (IRP) - Pursuing academic passions and interests is what helps our students engage in the material and make connections to the world outside the classroom. One such example in eighth grade science is the Independent Research Project (IRP). First, students generate their own investigative question related to their hobbies, interests, and curiosities. IRP topics selected by our students range from lacrosse, football, and soccer to music, art, and even other disciplines of science (chemistry, physics, aerospace, etc.) depending on student preference. Once a question has been selected, students analyze and interpret current research to create a hypothesis/claim that answers their question. Following the scientific method, they then design and conduct their own experiment, collect and analyze data, and use that data to support or refute their original claim.

Students also strive to apply their results to other real world scenarios and identify and discuss potential sources for error in their experiments. While the skills needed for this rigorous work start much before eighth grade, this is often the first time they are asked to put all the skills together into one product. In preparation, students practice these critical thinking/problem solving skills with many scaffolded lessons and labs based on earth science topics we learn throughout the year, giving them the support needed to master necessary skills. Then when ready, the IRP offers students the academic freedom to explore what matters to them while applying those skills. In the process we get to make more meaningful connections with students by learning about what is important to them and they, in turn, gain a deeper, long-lasting understanding of how science is prevalent in their world.

Middle School Electives - Within this section, IMS has placed a spotlight on two of its many electives. These two truly capture student interests and allow them the choice to pursue their passions.

Media Tech is a hands on filmmaking class where students produce short, original films. The students work in small groups where they utilize an assortment of software and filming tools. The end results are often personal narratives reflecting the lives of middle school students. Many are shared before the school in the format of Gator Vision on Wednesday afternoon. This is one class where students do not need to be motivated or told to get to work. They are constantly busy in the various stages of film production. The passion and interest they bring to the class is often shown in the enthusiasm they display and the quality of their final products. It's unique to have such a workshop-based learning experience for students at this age, but it works, and they really are the ones who drive the curriculum. For the 15-16 school year, a Media Tech 2 class was added for students interested in taking their learning to a more advanced level.

Photo Film Music attracts a more introspective student than the type who would take Media Tech. This class is best described as an art appreciation survey of the mediums in its title. Students are exposed to the work of master musicians, photographers, and filmmakers. They are then challenged to put these works in their cultural and historical contexts. Further extensions allow students to challenge their own artistic abilities and understandings by interacting with the work through various formats. As with Media Tech, Photo Film Music is a place of creative academic pursuit for students who are passionate about self-expression.

Afterschool Clubs - While there are many afterschool clubs that allow middle school students to pursue their passions, the following two examples center on student interest and passion.

FIRST Lego League Robotics Club - The IMS Robotics club has adapted Lego League Values and follows the guidelines to create an environment for students to take initiative in pursuing their learning. Students learn basic programming in the sixth grade science unit. The difference from the 6th grade unit is that the students in the club are given a real life challenge annually. For example how to improve senior citizens' life, to save energy and the environment, or to assist in a devastating disaster, and by researching and talking to experts they attain their own solutions show connections to real life. At the same time they are required to solve topic-related missions on a robot field with a robot and few exchangeable attachments they created.

WE Act Club - The WE Act Club at Islander Middle School is an after school club that meets every Tuesday and is open to all Islander Middle School students. WE Act is a yearlong educational program that stems from the inspirational WE Day event. As stated on the WE Day website, WE Act is the blueprint for young people to take action as agents of social change. WE Act is an educational program that empowers young people to become active local, national and global citizens. WE Act is more than curriculum, more than educational resources and action campaigns; it's a movement of students and educators who believe that some of the most powerful learning experiences happen when you make a meaningful difference in your communities and for the world. Islander Middle School students participating in the WE Act club will earn their way to the WE Day event in Seattle. In order to earn their ticket to WE Day, students take on at least one local and one global action. WE Act helps students gain diverse skills and perspectives that challenge apathy and encourage active citizenship. The WE Act program is designed to increase students' academic engagement, active citizenship, and university and workplace readiness through diverse learning tools and resources.

Destination Imagination - Destination Imagination is a worldwide organization that sponsors creative problem solving competitions for students from Kindergarten through university. This year IMS has **7 Destination Imagination teams**. Each team is made up of 5-7 students and is tasked with creatively solving one of 5 complex problems and a surprise Instant Challenge. The general topic areas of the challenges are Structural, Scientific, Improvisation, Fine Arts, and Technical. The teams form at the beginning of the year and meet about once per week until winter break. After winter break the teams meet at least twice a week in preparation for the regional tournament in March. Teams that win at the Regional level will continue on to the State Tournament in Wenatchee in April, and the top teams from state compete at the Global Finals in Knoxville, Tennessee in May.

ExploraVision Projects - 10th grade Biology students work in groups to imagine a future technology that could be used to solve an environmental problem. The project is based on the ExploraVision national competition. Although it is not a requirement of the project, some groups expand their projects in order to submit them to the ExploraVision contest. Each group selects and researches their chosen issue, seeking to understand the dynamics of the system(s) to which the problem is related. Groups work to discover one or more leverage points (flaws or components of a system which have a significant effect on the system's dynamic behavior) in these systems. Next, students imagine a technology that could be applied to one of these leverage points and research what, if any, prior research or technology exists that needs to be expanded on, and they write a description and 3-5 page paper about their technology and present it to the class.

Student Art Show - During the month of May, AP Photography students will display their work at a public venue like a restaurant or cafe. Students will develop a theme for their art show and create a promotional poster to advertise and promote their event. The students will host an opening reception for family and friends. All proceeds from print sales will go to the non-profit Youth in Focus (<http://www.youthinfocus.org/>), a local photography program for at-risk youth.

Theme 3: Beyond traditional curriculum and beyond the traditional classroom environment

Elementary Gardening Group - The idea started in September 2014 with a question at WM: Can we go in the Courtyard? Many fourth-grade students showed a keen interest in the courtyard. Parent volunteers had just finished clipping and pruning and there was a job for anyone who wanted to clean up our Courtyard Garden. Four girls started the work and each day more fourth-graders asked to join in. Now the West Mercer Gardening Crew is an even dozen, all fourth and fifth-graders. They meet once or twice a week during their lunch time. They have cleaned up the Courtyard Garden and have weeded it. They also planted bulbs in a garden, at the front of our school, to honor Nancy Burrill, a teacher, who passed away last school year.

The Gardening Crew also worked in partnership with the West Mercer Green Team, planning a special event for Earth Day in April. They worked with a Master Gardener to name each plant in the courtyard. Each student Gardener adopted a plant and researched it. For Earth Day, we will have tours of the Courtyard Garden. A Scavenger Hunt is also planned along, with signs for each plant in the courtyard. This group is a dedicated group who came together by chance but is developing a strong bond and want to support and take pride in their school.

Hour of Code at IMS - Hour of Code was a collaboration between all of the stakeholders in the IMS community. IMS has participated in the Hour of Code program for the past several years, but stepped up their efforts this year. The 2015 program was organized by parent Jane Bove, IMS Technology TOSA Becky Mullvain and IMS teacher Ellis Reyes. The objective was to encourage students, parents, and IMS staff to spend at least an hour during the week of December 7th. The company *Code.org* is the global organizer of this event and provides online modules at several programming levels for the participants to use. For each module that the students completed (up to 10), their names were entered into a raffle from which they could win prizes. The top prizes were an Xbox, gift cards, and technological peripherals. Generous members of the parent community donated each of these prizes. Overall, 286 students and 27 staff members participated. Approximately 45% of the participants in the program were girls. Ms. Bove, Mr. Reyes, and Ms. Mullvain also organized parent volunteers to help facilitate the event before and after school and spread the word throughout the community.

Conservation of Mercer Island - What role has physical geography played in American history? How have the real and perceived frontier and attitudes toward the land and its resources shaped our history? Students in Amanda Mattock's American History classes worked in groups to reflect on their learning in relation to these two questions and then researched a historical example or historical figure who conserved the American Wilderness. To bring the connection home, students then had to take a page out of history and use the same method to conserve Mercer Island. Students proposed projects that outlined their overall conservation goal, the mode they planned to use to conserve, and how that mode has been effective/ineffective in the past (with historical examples). Students documented their active projects and prepared a product for distribution to the community. Projects ranged from a community work day, to a social media campaign for a cause, legislative proposals, and news articles submitted to local press.

Mu Sigma Partnership - The MIHS International Entrepreneurship class partnered with Mu Sigma to complete a 9-week program in data analytics. Students learned that data analytics is the fastest evolving aspect of marketing and will drive most business decisions in the 21st century. The Mu Sigma data mining and data-driven decision-making model are a vital part of the present and future business work that our students need to learn about and be exposed to in order to become effective 21st century business people. At the end of the 9-week partnership, students gave a class presentation and participated in a "graduation" ceremony with Mu Sigma.