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## Technical Brief:

### *The Value of Investment in Math and Science*

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In 1987, the Mississippi Legislature took the bold move to invest in the education of its brightest young minds—and thereby the enhancement of its economic future—by creating the Mississippi School for Mathematics and Science. The school admits academically talented students from around the state and offers them college-level instruction in an intellectually challenging, physically safe, residential environment. Although the school’s per student cost runs considerably higher than the state average, research proves not only that MSMS offers the state an immediate return on investment, but also that consistently higher levels of funding are warranted as part of the state’s economic development efforts.

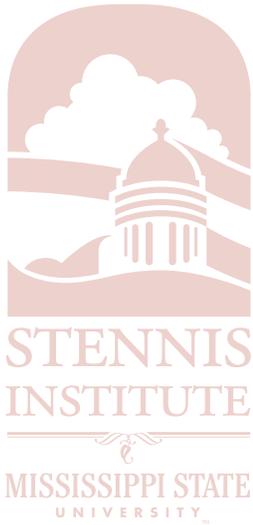
It may seem counterintuitive to sustain or increase funding for a specialized school during a recession. However, according to the Joint Economic Committee of the United States Congress, the return on investment in education is 16% over time, and that “fifteen to twenty percent of the annual average growth for the United States” relates to “increases in education levels” (8). In other words, education represents a reasonable investment from one decade to another—anyone with a 401(k) would be thrilled with a 16% return these days—and, more poignantly during a recession, education accounts for up to a fifth of whatever growth exists from one year to the next, provided that the institutions receiving funds can be held accountable for increasing students’ level of education. As The Heritage Foundation noted in an April 2009 brief, “The value of a STEM-educated workforce does not diminish in hard economic times [The acronym s.t.e.m. stands for science, technology, engineering, and mathematics. The STEM fields are those academic and professional disciplines that fall under the umbrella areas represented by the acronym]. In fact, in the current economic climate, it is increasingly more important that the U.S. produce new and innovative technologies that will expand and create new markets and add more jobs” (3).

The Mississippi School for Mathematics and Science raises the level of student achievement in every measurable category, and for students from every walk of life—our campus, in the words of one observer, constitutes the most diverse city block in Mississippi. Standardized test scores for MSMS’ last five graduating classes easily exceed the state average.

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#### About Us

Elected to the United States Senate in 1947 with the promise to “plow a straight furrow to end of the row,” John C. Stennis recognized the need for an organization to assist governments with a wide range of issues and to better equip citizens to participate in the political process. In 1976, Senator Stennis set the mission parameters and ushered in the development of a policy research and assistance institute which was to bear his name as an acknowledgment of his service to the people of Mississippi.



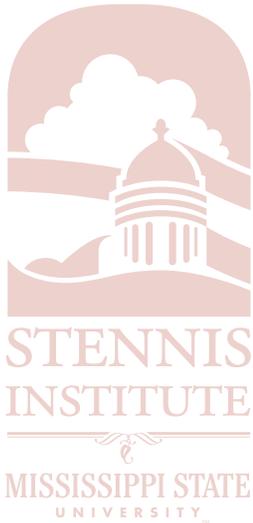
Year		English	Math	Reading	Science	Composite
2006	MSMS	28.6	26.5	28.5	26.5	27.7
	STATE	19.1	18.0	19.1	18.7	18.8
2007	MSMS	29.0	26.1	27.7	26.0	27.4
	STATE	19.0	18.1	19.1	18.7	18.9
2008	MSMS	29.6	26.8	28.6	26.5	28.0
	STATE	19.3	18.2	19.1	18.7	18.9
2009	MSMS	28.6	26.0	27.8	26.1	27.3
	STATE	19.1	18.3	19.0	18.7	18.9
2010	MSMS	27.9	26.0	26.7	25.9	26.8
	STATE	18.6	18.3	18.8	18.8	18.8

MSMS graduates have exceeded the average composite score by at least eight points in each of the last five years. Some may object that MSMS enrolls only students whose aptitude already compels them to succeed on such examinations. However, another glance at ACT data proves that the school turns potential into reality: our students' ACT scores increase over three points from the time they apply to the time they graduate.

Year	Composite		
	Incoming	Outgoing	Increase
2006	24	27.7	3.7
2007	24	27.4	3.4
2008	24.1	28	3.9
2009	23.6	27.3	3.7
2010	23.65	26.8	3.15

Additionally, by using ACT scores to measure MSMS students' preparedness for college, we see even more impressive results.

Percent of Students Meeting College Prep Benchmarks						
Year		English	Math	Reading	Science	Meeting All
2006	SCHOOL	98	87	95	71	62
	STATE	57	18	35	12	9
2007	SCHOOL	99	86	88	72	66
	STATE	57	19	35	13	9
2008	SCHOOL	99	88	94	71	70
	STATE	59	19	35	13	9
2009	SCHOOL	99	82	92	69	63
	STATE	57	20	34	14	10
2010	SCHOOL	97	82	86	65	59
	STATE	53	20	34	14	10



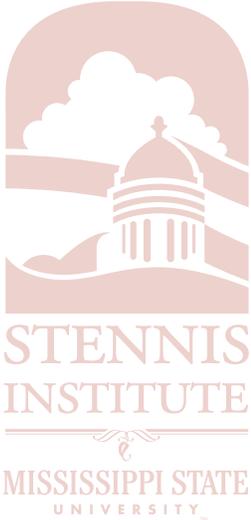
Furthermore, when MSMS students graduate, they enter fields that spur economic development at substantially higher rates than students from regular high schools. According to the school's most recent alumni survey, 52.7% of those who graduated before 1999 work in Science, Technology, Engineering or Mathematical professions, and another 14.8% own or manage businesses, or work in a business-related field. Perhaps most impressively, only 1.7% were unemployed. Graduates like these make MSMS extremely attractive from an economic development standpoint; our alumni seek jobs—and sometimes even create jobs—in the high-tech enterprises that Mississippi covets most.

Anecdotal evidence for economic development inspired by or associated with MSMS abounds. Leslie Henderson, who graduated from MSMS in 1994 and earned her bachelor's and master's degrees from Mississippi State in engineering, founded the international award-winning Lazy Magnolia Brewery in 2003. Lazy Magnolia is a "fast-growing manufacturing business that is providing high quality jobs," she said. We produce a value added product that had previously only been available for purchase from out of state. Therefore, more consumer dollars are staying in Mississippi because of the products my company produces." Furthermore, Mrs. Henderson credits MSMS with an educational experience that is still opening doors for her. "MSMS provided me the opportunity to take advanced courses in math and science which prepared me for a successful college career. I was afforded many other experiences during my 2 years at MSMS that showed me a broader picture of the outside world and the career possibilities that were open to me. Prior to MSMS I thought my career options were limited to farming and teaching school if I wanted to remain in the state."

Cynthia Henderson, who graduated from MSMS in 1995 and earned her engineering degree from MSU afterward, is still a Mississippi resident, though her work has taken her to other parts of the country. As an environmental engineer, she knows that "people need water to drink, wastewater from the toilet to be treated prior to release, and contaminated areas cleaned up. I'm also working on ecosystem restoration projects to better the environment—to make them more sustainable and resilient." Like Leslie Henderson, she still puts lessons learned at MSMS to use. "Experiences related to academics and opportunities at MSMS introduced me to a lot of topics I hadn't previously considered regarding interests and career possibilities. Competitions like science fair supported by faculty were important in building a lot of presentation skills as well as scientific which I still use today."

Richard Chinnis, another 1995 graduate, works as a process optimization and control engineer whose primary responsibility is ensuring the economic viability of his clients by providing solutions to reduce energy, waste and raw material consumption. His years at MSMS, he said, "directly contributed to my ability to carry out this task by holding me to high expectations and allowing me to develop critical thinking skills in an environment that fostered creativity, teamwork and healthy competition."

MSMS is busy nurturing the next generation of leaders in business and STEM disciplines. Shelby Beirig, a senior from Fulton, is conducting research at Mississippi State University's Center for Advanced Vehicular Systems as part of a team that is designing a new style of bumpers for garbage trucks. "The new design should completely eliminate fatalities of drivers in smaller vehicles that might rear-end the trash truck," she said. "So, by the end of our research a new design will be published, tests for the durability of whatever material we decide to use should be finished, and hopefully the manufacturer will buy our design all while following the regulations of the Department of



Transportation.” This kind of research has obvious implications for a state that has worked so hard to attract investment from the automotive industry. It also represents an impressive marriage of engineering and business.

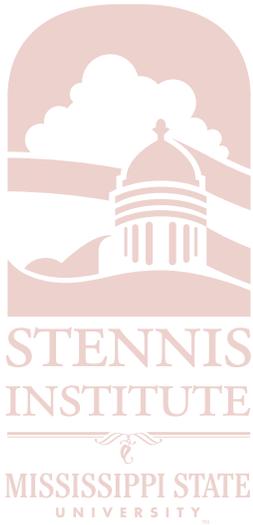
Sterling Harper, a senior from Gautier, is also conducting research with a team at Mississippi State. Their efforts focus on adding water vapor to a plasma environment and observing changes in the characteristics of the plasma. “Primarily, we noted a very large increase in the amount of hydroxyl,” he said. “This chemical has the ability to kill bacteria, break down chemical warfare agents, and make combustion cleaner and more efficient.” Harper is listed as one of the authors of the report on the experiments, which he intends to follow up with more work on improving the efficiency of combustion.

Miss Beirig and Mr. Harper participate in an innovative partnership between MSMS and Mississippi State University that allows MSMS students to conduct ground-breaking research while in high school. Dr. David Shaw, Vice President for Research and Economic Development at Mississippi State University, noted that this partnership gives students “a great opportunity to work with Mississippi State’s talented and award-winning faculty and to make contributions of their own. Very few high school students have a chance to be a part of research at this level.”

MSMS students connect with MSU in other crucial areas as well. Rahkee Khambhati, an MSMS senior from Greenville, is engaged in doing social science research exploring the positions of potential GOP presidential candidates on major issues for the 2012 election, as well as their strengths, weaknesses, assets and liabilities. Miss Khambhati’s political inquiries have acquired considerably greater academic depth. Another result is just as important: “this interest will continue throughout the remainder of my life, which is significant because my commitment to being a well-informed citizen will make me a better advocate for my community.”

“Both of our institutions are committed to science, technology, engineering, and mathematics education and realize the powerful impact that scholarship can have on the lives of our students and the state of Mississippi,” Dr. Shaw added. “We want our academically talented students to remain in our state throughout their K-20 educational experience so that they can become valuable stakeholders in the economic livelihood of our state. MSU has a tremendous track record in science and engineering research, and this provides exceptional benefits to Mississippians. Research is such an incredible engine for economic development, as we are seeing both in the immediate area around MSU, and statewide. It also provides a strong educational basis for the future. World-class researchers train undergraduate and graduates student as the workforce of tomorrow.”

Students and alumni like those listed above indicate a correlation between investment in MSMS and investment in the state’s financial future. The school’s presence has an immediate impact on attracting new businesses as well. Joe Max Higgins, CEO of the Columbus-Lowndes Development Link, said that “The enrichment to the community that is brought by both students and faculty is immeasurable,” and that the school’s impact on the community transcends mere test scores. “From the participation in the award winning “Tales of the Crypt” part of our annual Pilgrimage



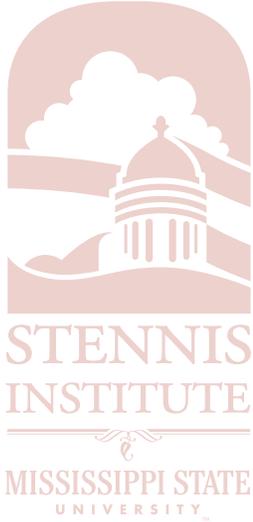
celebration to their mentoring of elementary students in our public schools, the students are an asset that totally enriches the Quality of Life for our community. When we are courting new business and industry, being able to showcase the test scores, the superiority of the students and the excellence of the faculty definitely gives us that added advantage with which few communities can compete.”

Roger Burlingame, President of CECO Building Systems, which has offices and manufacturing plants around the country, values MSMS in terms of its ability to produce future engineers. In an even more immediate sense, though, MSMS is the sort of school that helps him attract highly qualified professionals to his firm. “When I was filling a couple of positions recently, we had a prospect from Arkansas interview in our Columbus office,” he said. “He was very interested in coming to work with us, but concerned that his high school aged children would have to leave a really good situation where they lived. At that point, MSMS became a part of my recruiting efforts. When I told him that his kids could apply to enroll in a public school that teaches the elite students in the state, it made a difference. I wouldn’t hesitate to use MSMS as a recruiting tool again.”

Indeed, awareness of MSMS’ strengths can spur economic investment across the state. The Mississippi Development Authority noted in a statement to MSMS that a quality education is the foundation of a successful work force. “The Mississippi School of Mathematics and Science works to not only educate students in Mississippi but to advance educational opportunities in the state,” the statement read. The school plays an important role in nurturing a sophisticated and diligent workforce whose leadership skills translate to a wide range of business fields. As a result of the school’s mission, employers are gaining knowledgeable candidates with experience in critical fields, and leaders of national and international companies will see that Mississippi offers strong educational institutions which they would be proud to have their children attend.”

Because MSMS students come from all over Mississippi—and because they attend colleges all over the state—the return on investment in the school may be felt state wide. Allocations for the school should be made with conviction that it showcases the best STEM-oriented education the state has to offer. The money spent at MSMS has been spent responsibly and with great success, even though MSMS state appropriations are lower than its regional sister schools:

Name of School	FY2010 Budget	Number of Students	Dollars per Pupil	National Merit Semi-Finalists
Alabama School of Math and Science	6,957,767	264	26,355	1
Arkansas School for Math, Science and the Arts	7,650,338	225	34,001	6
Louisiana School for Math, Science and the Arts	6,678,547	322	20,740	7
Mississippi School for Mathematics and Science	4,370,000	268	16,305	10



Few problems in education that can be solved simply by spending more money on them, but improving MSMS' infrastructure would help it attract even more qualified students, and improve opportunities for economic development throughout the state. The school has never had an auditorium that can accommodate the whole student body. MSMS' computing system, which should incorporate the latest available technologies given the mission of the school, is several generations old and desperately needs an upgrade. Its dormitories, which are owned by Mississippi University for Women, sorely need upgrades. Its soccer teams use unlighted fields pockmarked with gravel, and a student who qualified for the state track and field meet last year practiced hurling the discus on an empty parking lot. Perhaps most important, MSMS faculty members need funding to conduct research that will have a positive impact on academically capable students across the state.

The legislature should be encouraged to see investing in MSMS as an opportunity to spend wisely on both education and economic development. MSMS' track record shows results in both areas, not mere speculations. Ultimately, given MSMS' potential for attracting economic development to the state, and retaining mathematically and scientifically talented students who can improve the state for years to come, consistently higher levels of funding for MSMS are warranted.

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\* *All other quoted material comes from personal interviews and emailed communications.*

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## About the Authors



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**Thomas Easterling** is a member of the English faculty at the Mississippi School for Mathematics and Science, and will begin a term on the Mississippi Humanities Council this May. He received his BA from the Louisiana Scholars' College at Northwestern State University, and his MA and his PhD in English from the University of Mississippi. His work has appeared in *The Oxford American*, *Brightleaf*, and a number of scholarly publications. He graduated from one of MSMS' sister schools, the Louisiana School for Math, Science, and the Arts.

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