REPORT ON STRATEGY TO ATTRACT AND GRADUATE MORE STUDENTS IN THE SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) FIELDS

RESPONSE TO SENATE RESOLUTION 120 OF THE 2012 REGULAR SESSION OF THE LOUISIANA LEGISLATURE

LOUISIANA BOARD OF REGENTS

January 10, 2013

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EXECUTIVE SUMMARY

Senate Resolution 120, passed in the 2012 Regular Session of the Legislature, asked that the Board of Regents develop strategies "to attract more students to, and graduate more students from, the state's colleges and universities" in science, technology, engineering and mathematics (STEM) fields.

After a survey, the Board determined that although a plethora of ongoing K-12 and higher education initiatives address the quality and accessibility of STEM education and workforce training, these frequently lack a coordinated focus on achievement of STEM goals. A statewide strategy and system of metrics are needed to understand and assess STEM outcomes of these diverse yet related initiatives.

Data which the Board of Regents is obligated to collect and manage includes key metrics regarding STEM outcomes. The Associate Commissioner for Workforce Education and Training is a position at the Board of Regents which exercises leadership for the Council of Workforce and Economic Development Officers. The Associate Commissioner, in collaboration with the Regents' Planning, Research and Performance Section, could coordinate fulfillment of the purposes of Senate Resolution 120 in the following manner:

1. Monitor STEM workforce needs by job category and region of the State;
2. Monitor progress of educational initiatives which directly and indirectly impact STEM workforce needs;
3. Monitor retention and completion rates of students majoring and graduating in STEM disciplines in each postsecondary institution; and

4. Render a report to the Legislature and other key stakeholders which addresses items 1-3, above, in 2016 and every three years thereafter.

INTRODUCTION AND BACKGROUND

Over the last several decades, Americans have become more accustomed to and dependent on rapidly advancing science and technology as part of our daily lives. In addition, local, regional, national and international economies are increasingly propelled by and dependent on such advances. To produce the expertise and training needed to drive these high-growth economic development areas, a large and steady supply of highly trained, highly skilled workers and entrepreneurs is critical. Significantly, the current supply of postsecondary graduates in science, technology, engineering and math (STEM) disciplines is insufficient to meet current and anticipated demand.

Senate Resolution 120, passed in the 2012 Regular Session of the Legislature, recognizing these market and educational dynamics in Louisiana, requests that the Board of Regents develop strategies "to attract more students to, and graduate more students from, the state's colleges and universities" in STEM fields. Specific issues identified in the Resolution included the following:

- Scientific, technological, and engineering advances of the 20th century fueled the economic dominance of the United States;
- As we moved into the 21st century and it became clear that our economic preeminence was threatened as other countries became more educated and started gaining economic ground, national leaders began calling for increased recruitment of students in STEM fields of study;

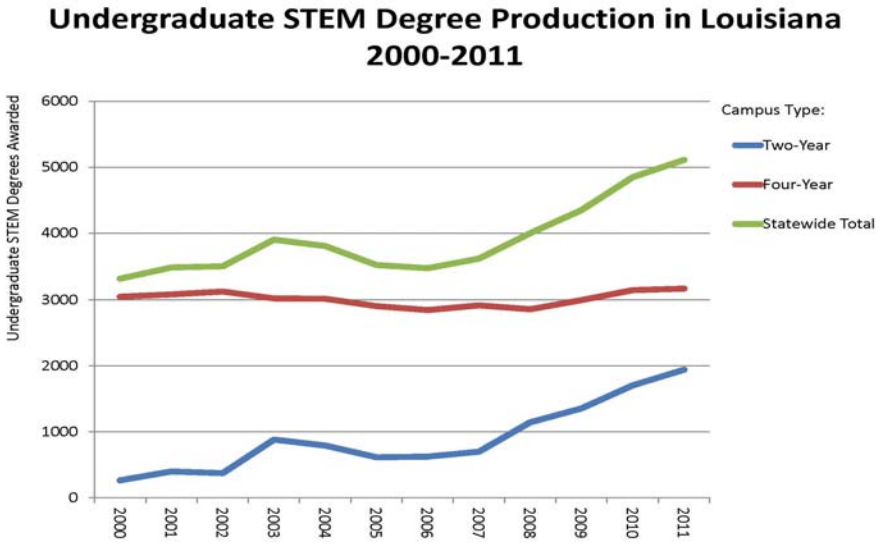
- Careers in science, technology, engineering, and mathematics serve to increase the State's and the nation's capacity for innovation as it engenders the creation of new ideas, companies, and industries;
- The urgent need for improved education in STEM disciplines is evidenced by the decreasing percentage of students entering and completing STEM degrees in postsecondary educational institutions;
- The United States produces fewer STEM graduates relative to other economically developed countries; and
- According to the January 2012 U.S. Department of Commerce report "The Competitiveness and Innovative Capacity of the United States", only fifty percent of students who start college in a STEM major graduate with a STEM-related degree.

The Board of Regents was asked to submit a written report of its findings and recommendations to the Senate Committee on Education no later than March 1, 2013.

OVERVIEW OF STUDY

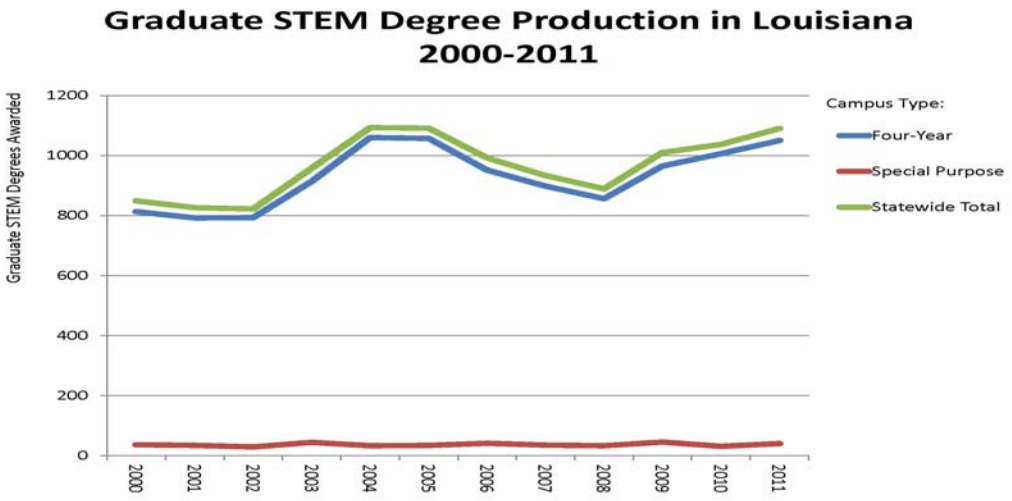
Senate Resolution 120, which requested the Board of Regents "to develop a strategy to attract more students to, and graduate more students from, the state's colleges and universities" in STEM fields, raises issues related simultaneously to STEM workforce and STEM completers: "more" college STEM graduates to fill which STEM workforce positions? To address this two-pronged question, the Board of Regents surveyed selected ongoing initiatives which address – directly and indirectly – STEM education and workforce needs. As the information below illustrates, Louisiana has a substantive bounty of such efforts.

A review of STEM degree production data shows that the State has already achieved positive results in enhancing postsecondary STEM student success. Substantial increases in undergraduate degrees, due in large part to the growth of community and technical colleges, have been realized since 2007:



STEM degree production at four-year campuses has remained stable, and has begun to increase somewhat as the State continues to recover from the 2005 hurricanes.

Though graduate programs were more measurably affected by the hurricanes and their aftermath, there has been an upswing overall between 2009 and 2011 to previous levels of success achieved during 2004-05:



At the same time, degree production at special purpose campuses, consisting of the health sciences centers, has remained relatively stable over the last decade.

While these data are insightful, they do not fully illuminate the impact on Louisiana's workforce: What STEM jobs were available? At what levels, in what regions? In what STEM fields? How many STEM graduates remained in Louisiana? What jobs did they actually fill?

Understanding the multidimensional and impactful relationship between STEM workforce needs and STEM graduates produced, and the way ongoing initiatives are influencing this relationship, is a necessary precursor to shaping future policies and strategies. Louisiana is investing significant resources in examining workforce needs by job category and region of the State; articulating K-12 and postsecondary curricula to address identified needs; and encouraging postsecondary institutions to produce graduates who meet market and societal demands. Yet no one has the singular responsibility to relate these initiatives to attracting and graduating more students from college specifically with STEM credentials. The Regents concluded that an appropriate strategy is to monitor and report on a coordinated, purposeful basis the STEM outcomes of major ongoing reform initiatives.

This study identifies major STEM-related initiatives underway and proposes to address the challenge by pinpointing and better understanding STEM outcomes in relation to the workforce.

FINDINGS

Louisiana's K-12 schools and districts, higher education institutions, Department of Education, Board of Regents, workforce development stakeholders, and Department of Economic Development are currently leading a range of initiatives designed – directly and indirectly – to foster student access to and success in STEM programs across all educational levels and prepare them for high-skill, high-pay jobs in a growing 21st-century science and technology economy. Sponsored by State and Federal agencies, colleges and universities, K-12 schools and districts, and other entities, these programs address issues ranging from development of curricula and professional development for teachers, to hands-on training aligned with specific industry requirements, to undergraduate and graduate research experiences in higher education laboratories. Following are brief overviews of selected ongoing projects related to STEM workforce development needs and education at all levels in Louisiana.

I. WORKFORCE DEVELOPMENT INITIATIVES

Board of Regents' State Council of Workforce and Economic Development Officers (CWEDO)

In November of 2011, the Board of Regents hosted the inaugural meeting of the State Council of Workforce and Economic Development Officers (CWEDO). The council is comprised of the chief workforce and economic development officers from each of Louisiana's public postsecondary institutions, system offices, and a designee from each of the agencies that make up the State's Workforce Cabinet (Board of Regents, Department of Education, LCTCS, LED and the LWC). CWED Officers

meet semiannually to address various workforce and economic development-related topics, including alignment with postsecondary education programs to enhance and improve the workforce needs within Louisiana.

Louisiana's Workforce Cabinet

The Workforce Cabinet, comprised of the heads of several agencies, including Board of Regents, Department of Education, LCTCS, LED and the LWC, has been working together to fulfill the vision of creating a world-class workforce development system in Louisiana. Fulfilling this vision will require successful execution of four major goals: (1) offer high-quality PK-12 education options for all children to ensure they consistently graduate on time with competitive levels of college and career readiness; (2) provide certification and degree programs that enable citizens to maximize their employability and career mobility by seamlessly moving between the educational system and the workforce; (3) maximize workforce participation by attracting unemployed and other underutilized workers to career development opportunities; and (4) regularly rebalance and restructure program offerings to meet the current and future needs of Louisiana's traditional and emerging industry sectors.

The Workforce Cabinet has identified an objective to improve STEM preparedness at the PK-12 level by expanding attainment of accelerated learning opportunities, including Course Choice STEM offerings, STEM-focused charter schools and LEA-driven STEM initiatives. Further, the Cabinet's vision for higher education emphasizes aligning programs to workforce needs, many of which are STEM oriented.

Louisiana Workforce Commission's STAR Rating System

Louisiana Star Jobs is a user-friendly, interactive search tool that ranks the best occupations in Louisiana according to salary, the number of openings and the prospects for each career. The system filters the ranking to suit the individual job seeker based on specific occupation or career choices, educational background and income requirements, then takes the user straight to the job listings and/or links to specific institutions in the user's area that offer the credentials needed to qualify for those jobs. Louisiana Star Jobs is designed to help a broad array of people – students in school considering which career to pursue, people who are working but are interested in new or better jobs, individuals actively seeking employment and people living in other states considering locating to Louisiana.

Louisiana Star Jobs finds and ranks jobs based on four criteria: projected demand, projected percentage job growth, the number of advertised job openings in the past year and wages. The stronger the demand and growth of a particular job and the higher the pay, the more stars it gets. Overall, highly valued occupations receive five stars. Occupations that pay well but have few job openings and poor prospects for the future are awarded fewer stars, just as those that may have many openings but pay poorly.

The Board of Regents is working closely with the Workforce Investment Council and LWC to explore the viability of utilizing the STAR system in conjunction with some of its initiatives (e.g. GRAD Act, Master Plan and Formula Funding).

Louisiana's Demand-Driven Workforce Development Plan

The Demand-Driven Workforce Development Plan, guided by the Louisiana Workforce Commission and prepared for the U.S Department of Labor, provides a strategic framework to guide workforce and economic development for a five-year period. The vision, goals, objectives and processes outlined in the State plan represent ongoing planning efforts that incorporate the Governor's vision for economic and workforce development and the strategies for increasing the capacity of Louisiana's workforce system.

II. K-12 EDUCATION INITIATIVES/HIGHER EDUCATION COLLABORATION

School Accountability System

Louisiana's School Accountability System calls for continuous improvement in student achievement and graduation rates. This system is based upon two principles: rewarding schools that grow academically and assisting schools and students who need help. Under the current system, schools must show improvement in the School Performance Scores (SPS) by meeting a growth target. Growth targets represent the amount of progress a school must make every year to reach the State's SPS goal of 120 by the year 2014. Beginning with the 2012-2013 school year, schools will be working to achieve Growth Goals, which is an improvement of 5 points or a total of 150 points for "A" schools and an improvement of 10 points for "B"-"F" schools.

Value-Added Teacher Assessment

Since 2007, Louisiana's Teacher Preparation Program Assessment Model (TPPAM) has used value-added data to measure the effectiveness of teacher preparation programs by linking student growth measures to their teachers, and to the colleges and universities that trained those teachers. The same value-added approach used to study the effectiveness of the teacher preparation programs is now used to comply with Act 54, enacted into law in 2010 and fully implemented in the 2012-2013 school year. Act 54 requires performance at every level of K-12 public education to be evaluated based upon student growth.

The Value-Added Model applies to teachers of grades and subjects that fall within the State's annual assessment program and allow for at least one year of prior test data. For the 2012-13 school year, teachers in grades 3-8 who teach core subjects, as well as high school Algebra I and Geometry teachers (about 36 percent of the State's teachers) will have value-added information that can be used to establish the student growth component of their evaluations. The Louisiana Department of Education is working to expand the number of teachers who have access to value-added data in future years by identifying valid State assessments for additional grade levels and content areas.

Louisiana Scholarship Program

With the express aim of providing families with greater educational choices and an increased opportunity for success, during the 2012 Regular Legislative Session Louisiana lawmakers established the statewide Student Scholarships for Educational Excellence Program. This program, providing vouchers to enable

students in low-performing public schools to enroll in approved nonpublic schools, is available at all levels, from kindergarten through 12th grade. Participating students will be able to opt to attend not only approved nonpublic schools, but also high-performing public schools.

Common Core State Standards

By 2014-15, students in Louisiana's schools will be exposed to a new set of Common Core State Standards that will better prepare them to be successful in the STEM fields. The development and implementation of the Common Core State Standards was a state-level effort led by the Council of Chief State School Officers and the National Governors Association. An overarching goal is to ensure that students graduate with the knowledge and skills most demanded by colleges and careers. This goal will be reached by the participating states focusing on sets of fewer, clearer, and higher standards that are research-based and internationally benchmarked in the areas of English Language Arts/Literacy and mathematics. Louisiana is one of 48 states and three territories that have signed a Memorandum of Agreement in support of the standards.

Common Core's mathematics standards place a strong emphasis on key topics at each grade level and allow students to progress across grades with a greater focus, coherence, and clarity. The new standards enable students to develop greater procedural fluency and a deeper understanding of mathematical concepts and skills when compared to existing standards. Students are taught to demonstrate better reasoning skills and understanding across different disciplines, which is important for the STEM fields. The new Common Core State Standards

are currently being phased in to varying grade levels in Louisiana's schools and will be fully integrated into the curriculum by 2014-15. Thus, future students in Louisiana will have a deeper understanding of content that is important for the STEM fields and will be able to apply reasoning and thinking skills at higher levels that will help them experience success once they attend college.

PARCC Assessments

The Partnership for Assessment of Readiness for College and Career (PARCC) is a consortium of 23 states that have received a $186 million Race to the Top Assessment grant to develop a common set of assessments in English Language Arts and mathematics that are aligned with the Common Core State Standards. The 23 states have reached agreement on frameworks for the assessments and set policies that clearly define the performance levels to be measured. The new assessments will require students to use knowledge in a way very different from previous assessments that have required rote recall. The new assessments will place a greater focus upon students applying their knowledge through multiple steps that require thinking, reading, and writing.

States that have volunteered to serve as Governing States, including Louisiana, have agreed to pilot the new assessments and implement the assessments in 2014-15. The Governing States have also agreed to allow students who obtain scores at the top two performance levels to be placed in entry-level credit bearing college courses in English and mathematics once research studies confirm that the PARCC scores are aligned with success in entry-level mathematics and English college courses. In addition, Governing States have agreed to accept

PARCC scores from students who reside in other PARCC states, meaning that Louisiana's students can be placed in entry-level credit-bearing English and mathematic courses in other states based upon their PARCC scores and students from other states can be placed in entry-level credit-bearing courses in Louisiana based upon their PARCC scores. This will motivate high school students to perform at higher levels in mathematics and English since their performance on the PARCC assessments will have a direct impact upon future college choices in Louisiana and other states. This will better prepare students to demonstrate mastery of core knowledge needed to be successful on the new PARCC assessments and to enter college with the necessary knowledge to successfully complete a college degree in the STEM fields.

Realignment of Teacher Preparation Programs

Although the new Common Core State Standards will not be implemented until 2014-15, Louisiana's teacher preparation programs have already begun to change their curriculum to prepare new teachers who will exit the programs prepared to address the new Common Core State Standards. Through a Core to College grant, PARCC Campus Leadership Teams have been formed on all campuses, and the teams are working together to communicate information about the Common Core State Standards and PARCC assessments. Colleges of Arts/Sciences/ Humanities are identifying where deeper content knowledge will be gained by new teachers and Colleges of Education are identifying new strategies that teachers will need to use to help students apply knowledge with the new Common Core State Standards. This alignment is important for candidates

currently enrolled in teacher preparation programs will be entering the teaching profession at a time when school districts will be transitioning from the existing standards to the new Common Core State Standards. Students who are taught by new teachers who use appropriate Common Core State Standards strategies will exit high school and enter colleges with the core knowledge and skills to successfully complete programs in the STEM fields.

Teacher Preparation Accountability System

It is important for new teachers to exit teacher preparation programs with a well developed understanding of the Common Core State Standards and PARCC assessments, but it is equally important for a sufficient number of new teachers exiting teacher preparation programs with certification in content areas (e.g., mathematics, biology, chemistry, physics, technology, etc.) that provide students with the base knowledge to pursue STEM fields in college. At the present time, the Board of Regents, Board of Elementary and Secondary Education, and Louisiana Department of Education are revising a Teacher Preparation Accountability System that will allow teacher preparation programs to earn additional points for the accountability system when producing new teachers who teach in STEM related fields (e.g., mathematics, biology, chemistry, technology, and physics). The new system will be implemented during 2013-14 and help to produce new teachers in critical shortage areas in Louisiana.

U.S. Department of Education, Title II, Part A (No Child Left Behind)

The purpose of the No Child Left Behind Funds is to provide grants to State educational agencies, local educational agencies, State agencies for higher education, and eligible partnerships in order to (1) increase student academic achievement through strategies such as improving teacher and principal quality and increasing the number of highly qualified teachers in the classroom and highly qualified principals and assistant principals in schools and (2) hold local educational agencies and schools accountable for improvements in student academic achievement. Title II – Part A funds awarded to higher education in Louisiana have been used through the Louisiana Systemic Initiatives Program (LaSIP). For more than 20 years, LaSIP has provided standards-based professional development (PD) on college campuses in the STEM disciplines for Louisiana teachers via K-16 partnerships.

III. UNIVERSITY-BASED INITIATIVES

Several universities in Louisiana offer unique opportunities for educators to develop and use deeper content knowledge in the STEM fields as they teach students in grades PK-12. As an example, the Cain Center at Louisiana State University and A&M College serves as a premier education research and outreach hub for the university and surrounding communities. The Cain Center's primary focus is using empirical research to design and deliver effective, innovative strategies to improve student learning in STEM disciplines. The center raises the capacity of existing teachers and prepares new teachers, responding to the acute need for qualified math and science teachers in Louisiana and across the country.

Following is a sample of STEM education initiatives taking places statewide with college and university leadership:

Louisiana Science, Technology, Engineering and Mathematics Research Scholars Program for Undergraduates (LSU and A&M College)

The Louisiana Science, Technology, Engineering and Mathematics Research Scholars Program for Undergraduates (LA-STEM) program, operated at LSU and A&M College with funding from NSF and the Board of Regents Support Fund, offers generous scholarships to undergraduate students, as well as the opportunity to work with top researchers in their fields of study. The goal of LA-STEM is to promote the vitality of STEM undergraduate programs by bringing together, mentoring, and providing research experiences to students from diverse backgrounds. Data show that LA-STEM students perform better academically than their peers, and faculty have recognized them for their exceptional research abilities.

Louisiana School for Math, Science, and the Arts (Northwestern State University)

The Louisiana School for Math, Science, and the Arts (LSMSA), on the campus of Northwestern State University, is a premier State-supported residential high school with competitive admissions for Louisiana's high-achieving, highly-motivated students. The LSMSA was established by the Louisiana Legislature in 1982, as a State-supported, residential high school founded to focus on mathematics, science, humanities and arts and to serve the academic, artistic, and creative needs of Louisiana’s best students.

GeauxTeach! Secondary Teacher Preparation Program (LSU and A&M College)

The GeauxTeach! Secondary Teacher Preparation Program's Math & Science track allows students to pursue an undergraduate degree in Biology, Chemistry, Mathematics or Physics and earn secondary teaching certification at the same time. No additional hours are required, since elective hours are used for education courses. GeauxTeach participants graduate with a content degree in four years, both certified and highly-qualified to teach. GeauxTeach mobilizes STEM faculty in support of K-12 STEM teacher-preparation, creating an efficient and effective teacher-pipeline. Since 2010, GeauxTeach has tripled its graduation rate, currently producing about 30 secondary STEM teachers annually – more than any other undergraduate institution in Louisiana.

Center for Applied Teaching and Learning to Yield Scientific Thinking (Louisiana Tech University)

The Center for Applied Teaching and Learning to Yield Scientific Thinking (CATALyST), housed at Louisiana Tech University, is a regional center for science and mathematics education for grades pre-K through 16+. Its primary focus is working with rural schools and the universities and university faculty that serve them. The goals of CATALyST are to improve student achievement in science and mathematics at all levels for all students by increasing teacher quality and to increase the capacity of local school systems to provide effective professional development. CATALyST activities include leadership programs, community

programs, curricular materials, research opportunities and support and resources for school systems and universities.

The Timbuktu Academy (Southern University and A&M College)

The Timbuktu Academy at Southern University and A&M College is an award-winning mentoring program for underrepresented minorities in STEM fields. The Academy's pre-college to graduate curricula include the Undergraduate Research Program, which provides students with the educational support they need to succeed in graduate school.

Collaborative Petroleum Services Degree Programs (Nunez Community College and Nicholls State University)

Nunez Community College and Nicholls State University developed a transfer agreement designed to make it easier for Nunez students to earn a bachelor's degree in petroleum services at Nicholls. Nunez's industrial technology courses, focused primarily on process technology, refineries, and chemical plants, will transfer to Nicholls' four-year petroleum services program. The four-year program at Nicholls, directly related to local and regional workforce needs, uses an emphasis on exploration and drilling to prepare students for supervisory positions. This program has built on existing relationships and successes in transferring students from Nunez to Nicholls and will encourage more students to pursue this path to a baccalaureate degree and become qualified for careers in management of Louisiana's petroleum industry.

Summer STEM Academy (Sowela Technical Community College and McNeese State University)

In order to address the skills gap between high school and college, Sowela Technical Community College partners with local parish school systems to provide the Summer STEM Academy. The Academy, for rising high-school juniors and seniors and previous spring high school graduates who are potentially interested in Science, Technology, Engineering, or Math-oriented careers, provides students with the opportunity to experience college-level STEM learning and earn six credit hours in the summer. Each student takes one three-hour College Algebra course, and a second STEM course selected from a list of options including Process Technology, Introduction to Instrumentation, General Physics, and Aircraft Math and Physics. Admission to the program is based on academic merit with the foci on students' grade point average, grades in mathematics courses, and PLAN/ACT or Compass mathematics scores. Funded by a cooperative grant from McNeese State University, the Sowela Foundation, and the Carl D. Perkins grant, the program is offered free of charge to qualified high school students.

IV. STATEWIDE POSTSECONDARY EDUCATION INITIATIVES

GRAD Act

The Louisiana Granting Resources and Autonomies for Diplomas (GRAD) Act was approved by the legislature and signed into law by Governor Bobby Jindal in June 2010. Pursuant to the GRAD Act, the Board of Regents has entered into six-year performance agreements with each of the participating institutions. In the agreements, the institution commits to meeting specific performance objectives in exchange for increased tuition authority and eligibility to participate in certain autonomies. The purpose of the GRAD Act is to increase student success in postsecondary education across all disciplines and at all levels. Several metrics collected through GRAD Act reporting relate directly to workforce development and STEM education and success, including passage rates on licensure and certificate exams, job placement rates, alignment of academic programs with workforce needs identified by the Louisiana Department of Economic Development (LED) and the Louisiana Workforce Commission (LWC), research productivity related to the State Science and Technology Plan and LED's target industries, and centers of excellence related to LED and LWC priorities.

Board of Regents Master Plan

The Board's Master Plan, adopted in 2011, includes targets and initiatives to build workforce readiness, and specifically sets goals related to development of STEM research capacity. The Master Plan requires universities with substantial research activity to submit a report every three years identifying and providing

data related to their STEM research priorities, including student participation and success.

Board of Regents Academic Program Review

The Louisiana Constitution charges the Board of Regents with the following powers, duties, and responsibilities relating to degree programs of public institutions of postsecondary education: (1) to revise or eliminate an existing degree program, department of instruction, division, or similar subdivision, and (2) to approve, disapprove, or modify a proposed degree program, department of instruction, division, or similar subdivision. In fulfilling its constitutional duties, the Board of Regents, in collaboration with the campuses, coordinates institutional academic programming with the overall needs of the State, including workforce demands in relation to curricular needs.

Board of Regents Collaboration with the Louisiana Innovation Council and Louisiana Economic Development

The Louisiana Innovation Council, created by executive order of Governor Bobby Jindal, has commissioned a survey of research assets to help guide LED's efforts to recruit new business and industry to the State. The Board's Master Plan Research Advisory Committee, established to implement the Board's Master Plan Research component, is collaborating closely with LED and Battelle, the external consultant engaged to conduct the study, to ensure that university research and workforce development initiatives are embedded in the State's pursuit of STEM-related companies. A major component of Battelle's focus is the workforce needs of the State as it pursues science- and technology-based businesses and industries.

Battelle's study will, in part, identify gaps in Louisiana's workforce preparation activities as they relate to the kinds of employers the State hopes to attract as the foundation of its 21st-century economy.

Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) Projects

Administered by the federal Department of Education, the GEAR UP grant program is designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education. GEAR UP provides six-year grants to states and partnerships to provide services at high-poverty middle and high schools. The Board of Regents, through the Louisiana Office of Student Financial Assistance (LOSFA), currently manages the statewide GEAR UP program. The statewide project is a $35 million, seven-year grant serving 7,500 students in 61 schools across Louisiana, following a student cohort completing 6th and 7th grades in academic year 2008-09 through their graduation from high school. A second GEAR UP award, held by the Lafayette Parish School System and including participation by the University of Louisiana at Lafayette, is more local in scope, but shares the objective of improving student preparation for college-level work and increasing their success in postsecondary programs. While GEAR UP programs are not exclusively focused on STEM disciplines, they provide vital tools for at-risk students to finish high school and enroll and succeed in postsecondary education.

Supervised Undergraduate Research Experiences (SURE) Program

The Supervised Undergraduate Research Experiences (SURE) program, a component of the Louisiana Experimental Program to Stimulate Competitive Research (LA-EPSCoR) project, seeks to increase the participation of women and other underrepresented minorities in STEM fields by providing opportunities for such students to conduct supervised research with a faculty mentor. Students learn more about their chosen field of study, and are able to use the experience to help them decide whether or not to pursue further education by attending graduate school. The SURE program:

- Provides opportunities for students to learn modern research and laboratory techniques;
- Gives students a clearer idea of their options for a future in research;
- Motivates students toward graduate study and careers in science and technology fields;
- Provides mentors assistance to enhance their research programs; and
- Improves student written and oral communication skills.

Louis Stokes Louisiana Alliance for Minority Participation (LS-LAMP)

The Louis Stokes Louisiana Alliance for Minority Participation (LS-LAMP) is a statewide, comprehensive systemic mentoring program aimed at rapidly increasing the number and quality of minority students earning baccalaureate degrees in science, technology, engineering, and mathematics (STEM) disciplines. An associated goal is to increase the number of minority students enrolling and succeeding in STEM graduate programs, with emphasis on the Ph.D. In its 16 years

of operation, LS-LAMP has awarded financial support to 8,785 undergraduate students pursuing STEM bachelor's degrees, and in 2011 LS-LAMP students earned 623 STEM degrees. In addition, since 2000 a total of 191 STEM doctoral degrees have been awarded to LS-LAMP alumni.

The current LAMP program proposes to attain the annual degree production objective of 850 minority STEM BS degrees by 2015 and to achieve the transition of at least 30% of these graduates to graduate school. The attainment of these objectives is reasonably ensured by holistic implementation of strategies characterized by:

- Expansion of effective "systemic mentoring" and learning practices for minority STEM undergraduate students (including research participation and financial support);
- Establishment of a bridge program for community college graduates transferring to four-year STEM programs;
- Collaboration with other statewide systemic programs, business and industry organizations, professional organizations, federal agencies and national laboratories, and other entities; and
- Enhancement of partner institutions' STEM infrastructure in a fashion that promotes total institutionalization of the gains of LS-LAMP.

Special emphasis is placed on (1) transfer of community college graduates to STEM disciplines in four-year institutions, (2) precollege outreach activities driven by the Louisiana Tuition Opportunity Programs for Students (TOPS), (3)

comprehensive collaboration with statewide programs, public and private stakeholders, and (4) broadening international research experiences for students.

SUMMARY AND CONCLUSIONS

The Board determined that many ongoing K-12 and higher education initiatives address the quality and accessibility of STEM education and workforce training; however, these frequently lack a coordinated focus on achievement of STEM goals. A statewide strategy and system of metrics are needed to understand and measure STEM outcomes of these diverse initiatives.

To determine how best to propel Louisiana's students into the high-tech workforce, we need a better understanding of the value of the array of STEM education initiatives. Collecting, analyzing, and regularly reporting existing data from K-12 education, higher education, and workforce development related to STEM is an essential first step. Through regular reporting, similar and related to current GRAD Act requirements, Legislators, the Governor, the Board of Regents, the Board of Elementary and Secondary Education, and stakeholders across the State will be able to measure the effects of the spectrum of STEM initiatives, develop collaborative initiatives, and make sound judgments relative to future needs and directions.

RECOMMENDATIONS

Significant quantities of insightful data relative to STEM education and the workforce are being regularly collected by the Board of Regents, Department of Education, Workforce Commission, Department of Economic Development, and other agencies. These data are available for continuing analysis to provide a pinpointed and comprehensive understanding of Louisiana's key STEM outcomes.

The Associate Commissioner for Workforce Education and Training, in collaboration with the Regents' Planning, Research and Performance Section, could lead this effort in a manner which fulfills the purpose of Senate Resolution 120 as follows:

1. Monitor STEM workforce needs by job category and region of the State;
2. Monitor progress of educational initiatives which directly and indirectly impact STEM workforce needs;
3. Monitor progress and completion rates of students majoring and graduating in STEM disciplines in each postsecondary institution; and
4. In 2016 and every three years thereafter, render a report to the Legislature and other key stakeholders which addresses items 1-3, above.