



28 November 2012

**To:** Rebecca Wyke, Chair  
UMS Performance-Based Funding Review Team

**From:** Harlan J. Onsrud, President, Faculty Senate (with unanimous support from elected members meeting of the University of Maine Faculty Senate)

cc. Performance-Based Funding Review Team Members, Board of Trustees Chair Michelle Hood, Chancellor James Page, President Paul Ferguson, Provost Susan Hunter, Faculty Senate Members, UMS University Presidents

**Subject: Improving the UMS Performance-Based Funding Approach**

This letter is in response to materials posted at <http://thinkmissionexcellence.maine.edu/performance-based-funding/>. The University of Maine Faculty Senate Executive Committee has reviewed the materials on the website and we also participated in the on-campus visit.

We believe the Design Principles as set forth on the following slide are reasonable assuming that a Performance Based Funding approach is deemed a worthy pursuit across the University of Maine System.<sup>1</sup>

## Design Principles

1. Select goals in line with Maine's needs.
2. Construct performance metrics:
  - To promote mission differentiation.
  - To ensure all institutions have an opportunity to benefit.
3. Limit the number of outcomes to be rewarded.
4. Use metrics that are transparent and replicable.

However, we have very serious concerns with the proposed metrics. The metrics as proposed work directly against achieving the primary goals of educating more Maine citizens and have numerous negative unintended consequences.

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<sup>1</sup> We note that the *Performance Based Funding* method has been highly controversial and has failed to achieve desired goals in numerous other states where it has been attempted. See Appendix 1. Thus we have serious reservations concerning the value of performance based funding and this important issue should be discussed in depth before proceeding much further. A more productive and rational approach for metric based funding of complex land-grant missions would be to (a) assess the economic return of investments in each academic institution and (b) assess the effectiveness of this return as measured against peer institutions. See Appendix 2.

We begin with a summary listing of the goals that we believe the Board of Trustees is intending to achieve followed by a recommended set of metrics for better achieving those goals. We then describe why and how the current proposed metrics work against achieving the primary goals.

We also wish to state at the outset that we have yet to see any proposed model and accompanying formulae. As such, the comments below are made pending review of the actual model and we are likely to want to make further comments once we are able to see and test the actual model.

## **I. Goals Meeting Maine's Needs**

It appears that the primary goals desired by the Board of Trustees are to:

- a. increase the number of graduates of UMS academic degree programs generally,
- b. increase the number of graduates of UMS academic degree programs whose graduates are in greatest demand by the business sector, and
- c. achieve the above two objectives as efficiently as possible on each campus in line with the mission of each campus.

It is these ultimate goals that should be measured and upon which a limited pool of incentive funds should be distributed in proportion to improved performance. All other goals listed in the preliminary materials appear to be sub-goals of these goals, specific methods by which the primary goals might be achieved or are goals appropriate to only some campuses. Equity demands that goals that cannot be measured and used to incentivize improved performance across all campuses should not be used to distribute funds from a common pool. Further, *methods* in achieving goals should NOT be mandated or measured since each campus should be free to choose its own best methods in achieving improved performance under the above three goals consistent with each campus' mission.

## **II. A Better Set of Metrics for Achieving the Goals**

### **Goal 1: Increase the Number of Graduates from UMS Academic Degree Programs**

Maine needs more university graduates at all academic levels (See Appendices 3 through 5). Further, by focusing first and foremost on increasing numbers of graduates (as opposed to increasing enrollments), strong pressure is automatically placed on universities to find ways to minimize time to graduation. Minimizing time to graduation substantially reduces the high costs of a university degree associated with extra living expenses, lost wages and extra loans to cover them when unnecessary additional years are spent in school.

In the calculations for the *Performance Based Funding Model* we recommend the following points for degrees awarded. These points appear to be far more rational from the perspective of meeting work force demands and supporting economic prosperity for the State of Maine.

<b>Degrees Awarded</b>	<b>Recommendation</b>
Undergraduate Certificate (industry recognized)	0.1
Associate's Degree	0.5 (to avoid double counting, grant only 0.4 for any person that also received a certificate as part of their associate's degree)
Bachelor's Degree	1.0 (to avoid double counting, grant only 0.5 for any person that previously received an associate's degree)
Graduate Certificate	1.5 (a grad certificate often requires half the number of courses needed for a Master's degree)
Master's Degree	2.0
Doctoral Degree	4.0

It is much easier to increase the numbers of graduates in some degree programs than in others. Further, higher level degree programs (as a general rule) contribute far more to innovation and business growth in a state than do lower level degree programs. The weight recommendations reflect this reality in the economy.

By example, associate's degree programs require half the number of credits or courses that a bachelor's degree program requires. Undergraduate and industry certificates have little standardization and should be only assessed at a very small proportion of an associate level degree unless it can be shown that certificates to be included in the assessment require at least 50% of the hours of training to acquire an associate's degree. Then the measure might be increased to 0.2.

Graduate degree programs typically require one-on-one weekly meetings between each and every student and their graduate advisor and require much higher credentials of faculty to offer credible graduate degree programs. Many universities use an average weight of 3.0 for Master's graduates and 6.0 for PhD graduates due to their much more intensive support needs and their much greater value to the business community and economy. We use smaller multiplier values in the chart due to the higher proportion of professional graduate degrees offered in Maine than in most states and this segment of graduates does not require the same level of intensive one-on-one work with faculty.

The 2010 census shows that a higher per capita income in a state is associated with a higher percentage of the state population with graduate (beyond the bachelor's) degrees. Massachusetts, Maryland and Connecticut have the highest percentage of the population with graduate degrees (around 15%) while also being at the top of the per capita income (about \$52,000). West Virginia, Arkansas, and Mississippi are near the bottom in the percentage of graduate degrees (around 6.5%) and are also close to the bottom for per capita income (about \$32,000). This indicates that the people with graduate degrees are often the movers or associated with the movers in creating wealth for the state that benefits the entire population of the state.

The figures for the fifty states on per capita income and graduate degree percentage can be used to find that the average graduate degree is associated with about \$130,000 per year of additional (over and above all income from bachelor's degree and below) income for the state. This additional income figure continues each and every year for more than 40 years of the graduate degree holder's working life.

However, the cost for the graduate degree occurs only once. At a marginal state tax rate of 8.5% and with the greater state income of the degree holder, the state would earn close to \$300,000 (present day value) additional in state taxes per graduate degree holder over the life of the graduate degree holder. Further, past studies performed by the UMS have produced statistics to show a multiplier effect of about 7:1 for every dollar invested in research. Thus investment in graduate degrees is associated with a tremendous return for the population of the state.

## **Goal 2: Increase the Number of Graduates from UMS Academic Degree Programs in Greatest Demand by the Business and Industry Sector**

The college level graduates in greatest demand in Maine as reflected by job advertisements for employees in newspaper and online postings primarily are in science, technology, engineering and mathematics (STEM) related occupations including health (see Appendix 3 and 4) assuming that the graduates also have high oral and written communication, critical thinking, English language, teamwork, problem solving, business and project administration skills (see Appendices 3 and 5). That is, the work force demand in Maine is highest for students that graduate in a STEM related field but who also have a strong traditional liberal education enforced with business skills.

In the calculations for the *Performance Based Funding Model* we recommend the following points for degrees awarded in STEM disciplines. These points appear to be far more rational from the perspective of meeting work force demands and supporting economic prosperity for the State of Maine.

<b>Degrees Awarded in STEM Disciplines</b>	<b>Recommendation</b>
Undergraduate Certificate in STEM Discipline (industry recognized)	0.1
Associate's Degree in STEM Discipline	0.5 (only 0.4 for any person that also received a certificate as part of their associate's degree)
Bachelor's Degree in STEM Discipline	1.0 (only 0.5 for any person that previously received an associate's degree)
Graduate Certificate in STEM Discipline	1.5 (a grad certificate often requires half the number of courses needed for a Master's degree)
Master's Degree in STEM Discipline	2.0
Doctoral Degree in STEM Discipline	4.0

By weighting in this manner, UMS campuses will be highly incentivized to redirect resources towards attracting and ensuring higher retention of STEM graduates. That is, while increasing numbers of college graduates among the population of Maine is important for advancing the state, increasing the numbers of graduates in STEM fields is even more critically important for innovation and the economic growth of Maine's current and future industries.

## **Goal 3: Achieve Increased Numbers of College Graduates in the Maine Population as Efficiently as Possible in Line with the Mission of Each Campus**

One should start from the presumption that each campus is operating relatively efficiently in accomplishing its current mission. Not all campuses are pursuing identical missions and the distinct missions of each campus should be preserved. Some campuses may be far more expensive per student or per full-time equivalent (FTE) faculty member because the campus might serve many more public and industry service needs than other campuses, provide much more expensive graduate programs that

involve a much greater investment in laboratories and buildings, require more specialized faculty, or may need to provide much more graduate student financial support. A campus might also financially support a much higher percentage of expensive STEM programs than other campuses. The distinct missions of UMS campuses and the proportion of state appropriations distributed in order to support these missions have been worked out over many years and thus any action to add or take away a proportion of State appropriation should be based on achieving or failing to achieve the ultimate goals as set forth under Goals 1 and 2 above.

There is no need to assign a productivity metric since increased productivity is a direct result of the process of competition among the campuses. Note that if only goals 1 and 2 are used as the basis for reward or penalty, all campuses will strive energetically to continually increase the numbers of students graduating from their degree programs with an extra emphasis on attracting and retaining students in their STEM programs. If all campuses are equally successful in increasing the percentage of students coming through their programs (e.g. all increase the percentage of their graduates in these two categories by say 5%) the formulae should be designed such that all will receive the exact same percentage of the pooled state appropriation as they otherwise would have received. However, if a campus falls behind or pulls ahead in competition with the other campuses it will be proportionately penalized or rewarded based on its efficiency compared to the rest of the campuses. This approach keeps all campuses continually looking over their shoulders to ensure that they are always at least as efficient as the other campuses in increasing numbers of graduates. The approach gives each campus the freedom to pursue the innovative approaches best suited to their own context and mission in reaching increased efficiencies and keeping abreast of the competition. In this way all campuses continually increase their efficiencies even in the instance where only minimal redistribution of funds might occur.

### **Performance Allocation Percent**

Five percent of the historical E&G budget distributed to the universities will be placed in a pool and then redistributed based on the two outcome weights. This % might increase over the years but we envision that a steady 10% pooled amount from the state appropriation each and every year would provide a sufficiently strong incentive to continually increase the numbers of students recruited and retained through to graduation. More than 10% in a pooled amount has potential to cause great instability in planning from year to year at each university.

Because the goal is to incentivize universities to enhance their performance in furtherance of specified goals, there should be no distribution based on performance until all universities have had a minimum of full year to alter their practices to enhance their performance. A distribution without first supplying an opportunity to respond to the new incentives would be irrational and a cause for severe criticism of the program.

### **Outcome Weights**

For equity purposes, outcome weights for the two measured goals should be applied the same for all campuses. We recommend that the weights be as follows:

<b>Outcome Weights</b>	<b>% applied to each measure</b>
1. Degrees Awarded (% increase or decrease from the average of the previous five years)	70%
2. STEM Degrees Awarded (% increase or decrease from the average of the previous five years)	30%

We believe the overall number of Degrees Awarded should have a substantially higher weight than the number of STEM Degrees Awarded since the second is a subpopulation of the first.

If assessments are based on percentage improvements, no campus is in a better position than any other campus to increase their numbers of graduates under either 1 or 2. The incentives stay focused on every campus on increasing numbers of graduates (as opposed to increasing enrollments) with the added benefit of minimizing time to graduation and thereby minimizing college expenses for students.

Note that a campus with only 200 students should have a much easier time in increasing their degrees awarded by 10% than a campus with 10,000 students. However, in a similar manner, falling short by 10% in a particular year from the previous five-year average at a small campus could have a devastating effect on that campus' distribution from the pool. This should keep campuses on their toes and have them always aggressively recruiting and exploring means for retaining students.

### **III. Why and How the Current Proposed Metrics Work Against Achieving the Primary Goals**

The following comments are in regard to metrics contained in the file titled *Documentation-of-PBF-Model.pdf*

#### **1. Data**

*Discussion:* The statement is made in this section that "To minimize the unintended consequences of any anomalies in a given year, the model is based on the most recent three years of data." We believe three years of data is too short and a five-year data period would be far more effective in lessening anomalies caused by high and low spikes.

#### **2. Point Calculations**

##### **A. Degrees Awarded**

*Discussion:* The existence of a core populace with graduate degrees in a state is extremely important to the economic well being of the state. This need and evidence supporting this reality is discussed under Goal 1 in Section II above.

*Recommendation:* The weights need to be increased substantially for master's graduates and doctoral graduates as suggested above.

##### **B. Adults and Transfers**

*Discussion:* These metrics run counter to the true goal of increasing educational attainment for Maine's population. We are very surprised that the Performance-Based Funding Review Team would place greater value on degrees awarded to adults and transfer students over those awarded to traditional aged students and those students who initially chose a UMS campus for their education and stayed with it until graduation. In fact, a degree earned by a traditional younger aged student is in general of greater economic value. They contribute to the economy for a much longer period and also have a much lower medical need per year than a comparable older worker just receiving a degree.

The metrics also create a bias against the State populace that have an undergraduate degree and want to transition to a field that is in greater demand in the marketplace, such as to a STEM field, by pursuing a graduate degree in the new field. Why is the review team interested in only retraining the lowest level trained population of the state and not those that already have a degree and could greatly enhance their livelihood and the state's economic well-being through transition to a new occupation in greater demand? These metrics suggest that the University of Maine should drop its new 24/7 distance education graduate programs and replace them with undergraduate distance education programs

primarily for students that do not yet have a degree. This would be very unwise in being responsive to the high-level work force needs that the State of Maine most needs.

Further the current Transfer metric based on 25 years of age for an adult has the unintended consequence of providing an incentive to universities to stretch out the time to graduation for traditional students rather than reducing their time to graduation. Receiving premium points for a student that completes a degree in 7 years rather than 6 years makes very little sense.

Further, what is the logic for 24 credits? It seems we should be recruiting older adults who have at least a year's worth of credits under their belt (i.e. 30 credits) since these older students have a much better chance of finishing a two or four year degree than those that do not have such a track record. If you have less than a year of course work you are essentially starting a new undergraduate degree.

The proposed metrics create biases against Universities whose primary population is traditional aged students and against those who are following upward paths of high-level educational attainment. These biases violate the purported design principle that performance metrics should be developed: *To promote mission differentiation and to ensure all institutions have an opportunity to benefit.*

*Recommendation:* Degrees awarded should be the primary goal sought and only a metric that directly measures that goal should be included for assessing the performance of universities. Recruiting older students such as through distance education or through improving course transfer mechanisms is only a *means* to an end. Universities should be free to pursue any and all means to increase their numbers of graduates and biases should not be held for or against certain populations. The campuses themselves are positioned well to determine which populations they should go after commensurate with their missions and their available resources. They should not be micromanaged and the eyes of each university should be drawn back continually to the primary goals as opposed to focused on methods that may or may not be effective on some campuses in reaching the ultimate goals. If particular methods are ineffective, they should be dropped yet the proposed approach does not allow this.

### **C. Priority Fields**

*Discussion:* There is significant logic in focusing on STEM and Allied Health fields due to high marketplace demand for graduates in these fields at the current time. However, merely awarding premium points will be ineffective in motivating universities to significantly expand numbers of graduates in these fields.

*Recommendation:* We suggest making increased numbers of graduates of STEM and Allied Health fields as a major goal of the Performance Based Funding initiative and measuring this number directly as suggested under Goal 2 in section II above.

### **D. Productivity**

*Discussion:* The proposed metrics of *Throughput of Students* and *Financial Productivity* are by far the most disturbing of the measures presented in the proposal by NCHEM. The measures suggested merely measure, by analogy, numbers of widgets and the cost of widgets. In industry a major additional concern would be the quality of those widgets. Lack of differentiation among widgets (i.e. all graduates are the same in terms of equal economic value to society) results in a race to the bottom. That is, if high quality and cheap quality widgets are all to be valued and priced the same, all producers are forced to produce cheap widgets because price differentiation is not an option. That is, use of these measures would drive all campuses to now produce cheaper two year degrees with minimally trained instructors because the financial rewards in teaching those students will be the same per student as teaching a doctoral or STEM student. In fact, the rewards will be even greater for lower level students since universities can move them through to graduation much faster. Thus universities will race to avoid teaching expensive programs that have much higher benefits to society because the formula from a practical perspective values low level academic degrees the same or greater than high level degrees.

Further, the metrics completely ignore the other large number of services that some campuses, such as the University of Maine, provide to the State at large as part of its land grant mission. By example,

Cooperative Extension plays a huge role in supporting the Maine Food System. This industry is worth over \$718 million wholesale at the farm and over \$3 billion retail. Maine's largest commodity, potatoes, was worth \$168 million wholesale in 2011. Extension recently saved this industry over \$26 million in crop losses and pesticide applications in controlling the disease late blight.

The productivity metrics completely contradict the rationale that universities should be mission driven. The metrics imply that all missions should be the same and they should all be at the lowest college academic level possible. The reward structure will drive all universities to the lowest level mission and that would be a travesty for the State. The metric, as stated (degrees per 100k revenue) punishes more expensive, full service campuses. The metric also punishes STEM degrees since they are more expensive.

*Recommendation:* Drop the productivity measures all together since they are not needed. Incentives for pursuing enhanced efficiencies in increasing numbers of graduates fall out naturally as discussed under Goal 3 in section II above.

### **E. Credit Accumulation**

*Discussion:* The logic for supplying this transition metric is largely eliminated by using a more straightforward and rational based transition as discussed under *Performance Allocation Percent* in Section II above.

*Recommendation:* Drop this measure since it is a surrogate and indirect measure and is not needed if the alternative approach as suggested above is followed.

### **F. Research and Development**

*Discussion:* Research productivity may be and is regularly measured at leading universities by various standard means such as numbers of funded research projects and amounts of funded research. However, to measure this productivity at some UMS universities and not at all universities results in a situation of counting apples at some institutions and oranges at others. Comparisons become complex and readily subject to manipulation based on the whims of those developing formulae. Further, the measures as applied are irrational. Why should a large grant to the university from the National Science Foundation or a Defense Agency that might support a project of vast potential economic importance to the state (e.g. wind energy) be valued less than a grant from a local Maine funding source? Past studies performed by the UMS have produced statistics to show how research and development is a driver for the economy and has a multiplier effect of about 7:1 for every dollar invested in research.

*Recommendation:* Unless all universities are measured on their percentage of increase or decrease in performance based on this measure, we highly recommend that the measure be dropped for all institutions. It works against creation of a level playing field in the competition for funds from a common pool.

## **3. Dashboard**

### **A. Performance Funding Allocation Percent**

*Discussion:* This means of proportion among the universities seems highly inappropriate. The statement is made that "This means that 5% of each institution's historical E&G appropriation (excluding debt service) will be placed in a pool and then redistributed based on the 5 Outcome Weights."

The University of Maine has approximately 35% of the students in the UMS system and receives historically about 50% of the State of Maine appropriation. This is due to the fact that the land grant university provides many more service and outreach missions than other universities provide, has a much more extensive offering of undergraduate courses, has much more expensive high level masters and doctorate programs and provides many more expensive STEM programs that are so critical to the well being of the current and future economic advancement of the state. The assumption should be that



the cost differential is approximately appropriate as reflected by the current state E&G funding allocation distribution. This should be the beginning point in any assessment prior to applying a model to provide incentives to campuses to increase performance in furtherance of specific new goals. The suggested means of distribution is irrational if the goal is *To promote mission differentiation and to ensure all institutions have an opportunity to benefit.*

#### **4. Outcome Weights**

*Discussion:* As discussed above, the proposed outcome weights are irrational in that the same weights should be used for each outcome for each campus. If assessments are based on percentage improvements, no campus is in a better position than any other campus to increase their graduate numbers. Keeping the goals simple and the measures of those goals direct, straight-forward and readily determinable minimizes the opportunity to manipulate formulae to further political agendas rather than the achievement of core goals.

*Recommendation:* Providing simple, transparent and direct measures of a minimum number of core goals is the most equitable means of supporting a performance-based funding distribution and provides the strongest incentives for each campus in achieving the goals.

## **APPENDIX 1**

### **References Discussing the Severe Limitations of Performance Based Funding as Applied at the State Level for Universities**

Dougherty, Kevin J., Rebecca S. Natow, Rachel J. Hare and Blanca E. Vega, The Political Origins of State-Level Performance Funding for Higher Education: The Cases of Florida, Illinois, Missouri, South Carolina, Tennessee, and Washington, CCRC Working Paper No. 22, October 2010, Columbia University, New York, NY

Dougherty, Kevin J., Rebecca S. Natow, Rachel J. Hare, Sosanya M. Jones and Blanca E. Vega, The Politics of Performance Funding in Eight States: Origins Demise and Change, Final Report to the Lumina Foundation for Education, February 2011, Columbia University, New York, NY

Dougherty, Kevin J., Rebecca S. Natow and Blanca E. Vega, Popular but Unstable: Explaining Why State Performance Funding Systems in the United States Often Do Not Persist, Teachers College Record (Columbia University), Volume 114, 030301, March 2012, 41 pages

## APPENDIX 2

### **Rational Methods for Assessing and Measuring the Performance of a Complex Land Grant Institution**

Recently, discussions have emerged that have asked the University of Maine System to react more effectively to the needs of the state of Maine. Among the needs articulated are an increased number of graduates in the STEM fields (science, technology, engineering and mathematics) and a need to increase the number of college graduates to increase state revenue and help reduce the demands on state aid for the elderly and poor. Improvement in the revenue for the state is a reflection of the improvement in the quality of life of Maine citizens.

This is not a new challenge. Before the US Civil War there was a need for economic advancement that was met with the creation of Land Grant Colleges in 1862 for each state, including the University of Maine in this state in 1865. These institutions were focused on the agricultural and mechanical arts but, interestingly, also taught Greek and Latin. For what purpose were these schools really intended? These schools were intended to provide a broad education for farmers and mechanics, so that they could not only more effectively produce industrial innovation and more effectively farm, but also they could create a middle class who would lead the farming and industrial communities forward with help from the most advanced agricultural and technical research and outreach. This challenge is unchanged. The University of Maine still promotes economic development of the state and improves people's lives through basic and applied research, professional education and state-wide outreach.

For the University of Maine, the Maine Land Grant College in Orono, the mission has not really changed since 1865. But it has never been easy or cheap. Economic development through research, professional education and state-wide outreach requires space, faculties with specialized skills and knowledge, graduate level education, faculty research, and a commitment to outreach. The return on investment is measured by the associated economic development resulting from the application of the land-grant mission. The cost of the large farms that were given to the land grant schools has been replaced with the cost of supercomputers and extensive laboratory and clinical equipment. Typically, the more advanced or the more technological the degree, the higher the demand for equipment. Further, some of the faculty in technical areas must be more highly paid since there is a high value market for the skills of an engineer, nurse or programmer in society. Cooperative Extension has an office and outreach program in every Maine county to help Maine residents solve problems at home and work, on farms and in communities. These are examples of the land-grant mission where investment will yield possible great returns but the teaching is focused and its return to the state cannot be measured by tuition income.

Recent data from job advertisements in Maine for employees, ostensibly a good measure of people who are hard to find, shows that individuals with university training in the usual occupations - nursing, engineering and computer science- are in short supply (See Appendix 3). However, the same advertisements for open positions in Maine show that in addition to specialized training employers want those same individuals to be able to communicate with customers and solve problems. The latter skills are less about the specifics of a professional degree and more about learning a broad set of tools that are applicable in a range of situations. This idea has been institutionalized by organizations that accredit professional programs like, engineering, nursing and computer science and who demand a specific breadth of education in their degree programs. This is the sort of education that is best served by a comprehensive university, a university which can provide state-of-the-art technical education but which also has a critical mass of broader skills.

The 2010 census showed that a higher per capita income in a state is associated with a higher percentage of the state population with graduate (beyond the bachelor's) degrees. Massachusetts, Maryland and

Connecticut have the highest percentage of the population with graduate degrees (around 15%) while also being at the top of the per capita income (about \$52,000). West Virginia, Arkansas, and Mississippi are near the bottom in the percentage of graduate degrees (around 6.5%) and are also close to the bottom for per capita income (about \$32,000). This indicates that people with graduate degrees are often the movers or associated with the movers in creating wealth for the state that benefits the entire population of the state.

If we look at the job advertisements, it is clear that employers in the state want graduates of technical and professional programs in the STEM fields. For example, while demand is high the average high school graduate earns \$25,900 per year. The average starting wage for a mechanical engineer is nearly \$61,000. The average debt load for students in Maine is just under \$30,000, meaning that the pay difference in the first year after college is enough to pay off the investment in a mechanical engineering degree.

The figures for the fifty states on per capita income and graduate degree percentage can be used to find that the average graduate degree is associated with about \$130,000 per year of additional (over and above all income from bachelor's degree and below) income for the state. This additional income figure continues each and every year for more than 40 years of the graduate degree holder's working life. However, the cost for the graduate degree occurs only once. At a marginal state tax rate of 8.5% and with the greater state income of the degree holder, the state would earn close to \$300,000 (present day value) additional in state taxes per graduate degree holder over the life of the graduate degree holder. Thus investment in graduate degrees is associated with a tremendous return for the population of the state.

How does the University of Maine System address the needs of the state? We need to keep tuition affordable for all residents of the state. We need to support those degrees that allow the students to not only fill current jobs but also build for the jobs of the future, and we need to recognize that the current jobs as well as the jobs of the future will need a broad range of skills. However, as long as we graduate students in fields that can return the financial investment in a handful of years and that prepare students for a lifetime of higher earnings, we will need to make sure that the institution that can deliver these results are healthy and affordable for all students.

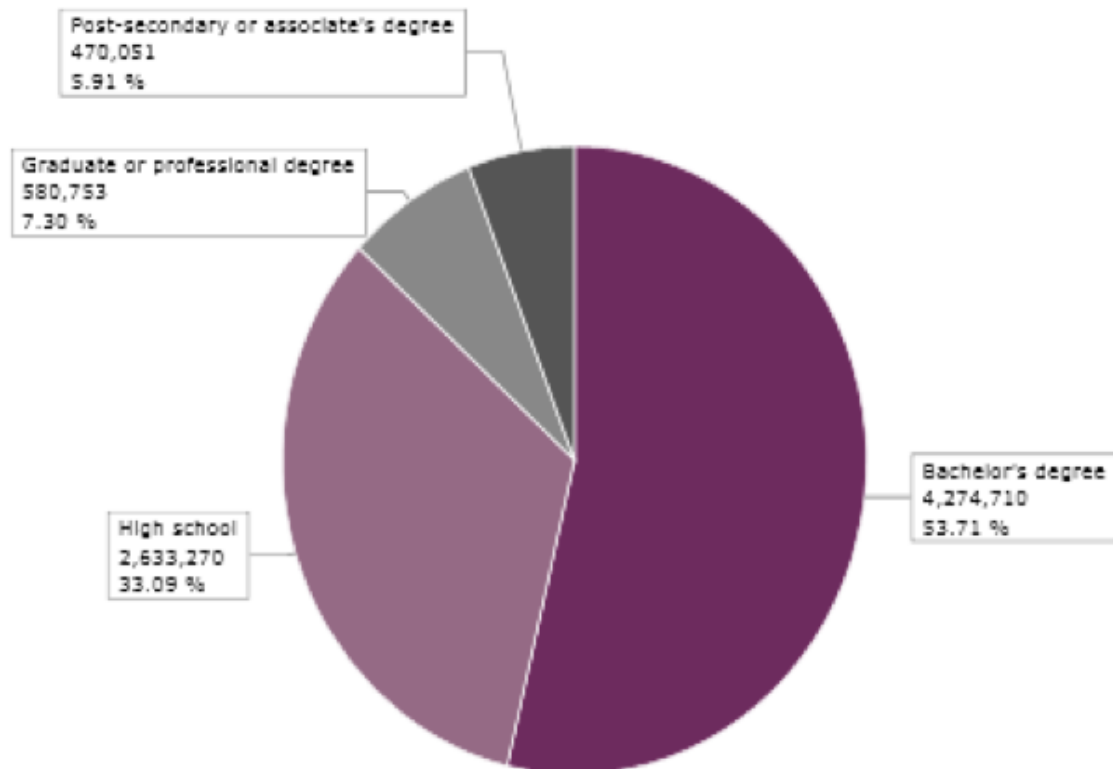
Metric based funding of the complex land-grant mission should be based on the economic return of the investments. Alternatively, tuition return effectiveness or other measures are best measured by comparison to peer institutions and their respective state economics. Land-grant peer institutions for the University of Maine have often included New Mexico State, University of Rhode Island, University of New Hampshire, Montana State University and the University of Wyoming.

## APPENDIX 3

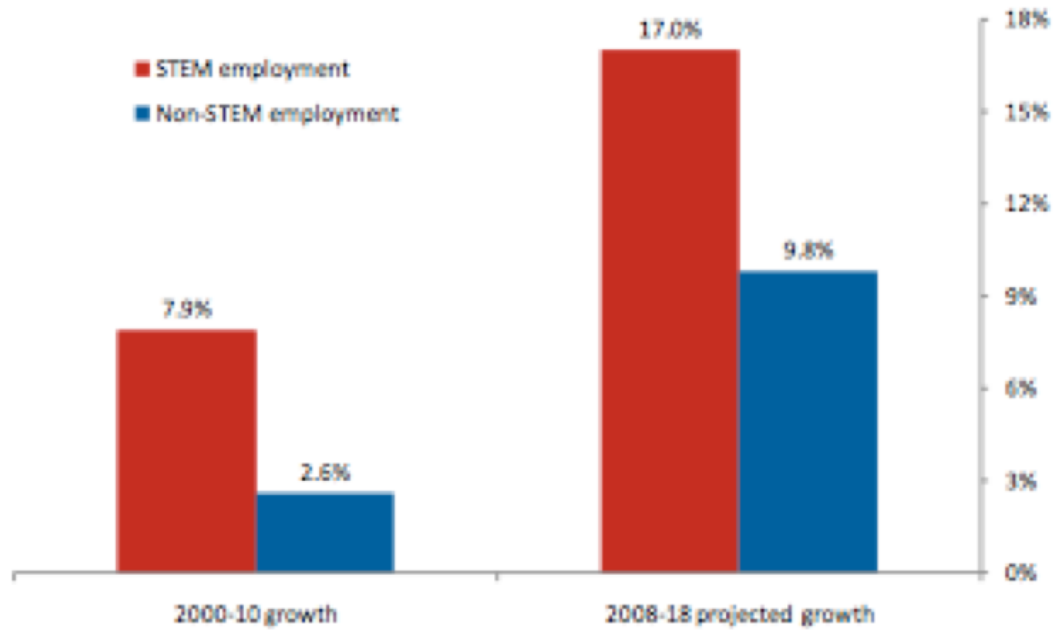
### Selected Graphics Presented by John Dorrer in presentations Across Maine

John Dorrer, Director, Jobs for the Future Building Economic Opportunity Group and former Acting Commissioner and Director of the Center for Workforce Research and Information, Maine Department of Labor

## For 7+ Million Internet Job Postings in 2011, Education Requirements



**Figure 1. Recent and Projected Growth in STEM and Non-STEM Employment**

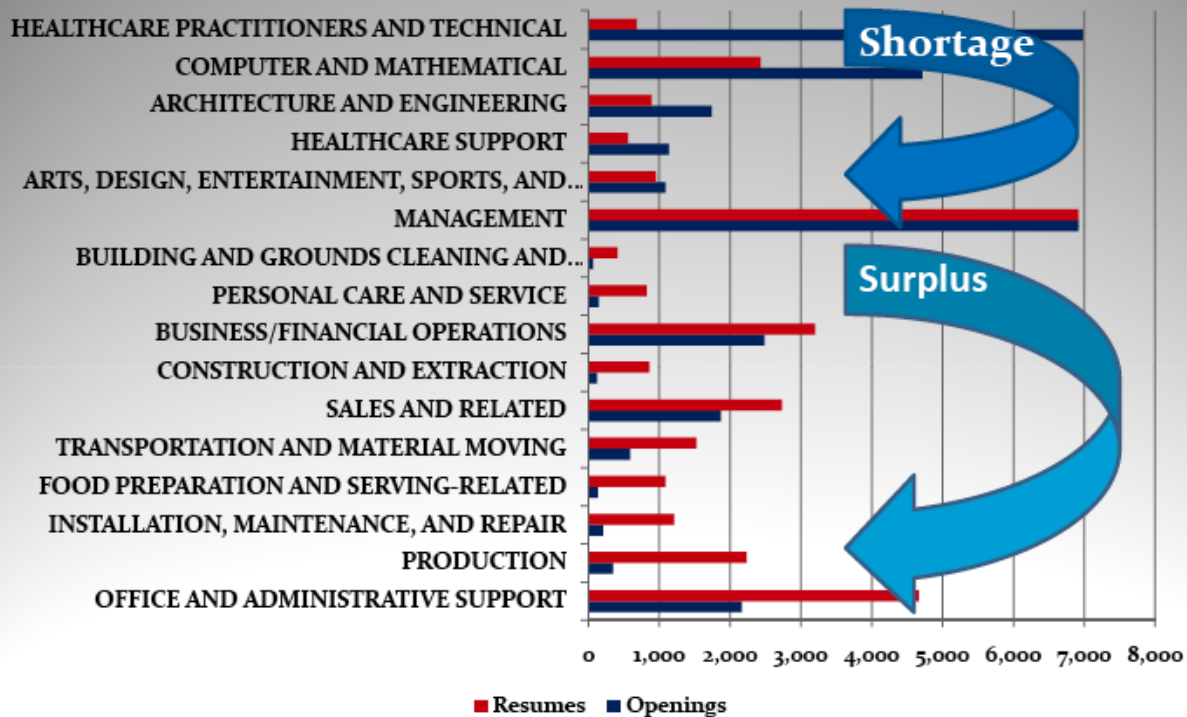


Source: ESA calculations using Current Population Survey public-use microdata and estimates from the Employment Projections Program of the Bureau of Labor Statistics.

## Supply & Demand by Occupation Group

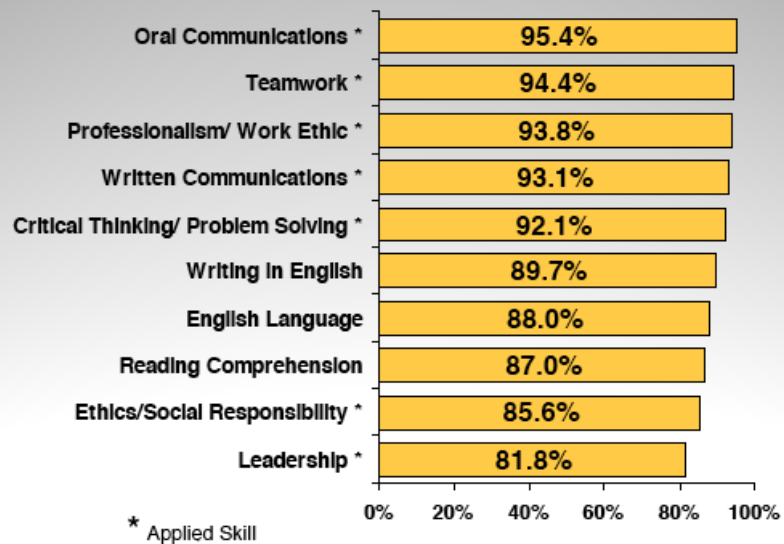


Data from Burning Glass Technologies:

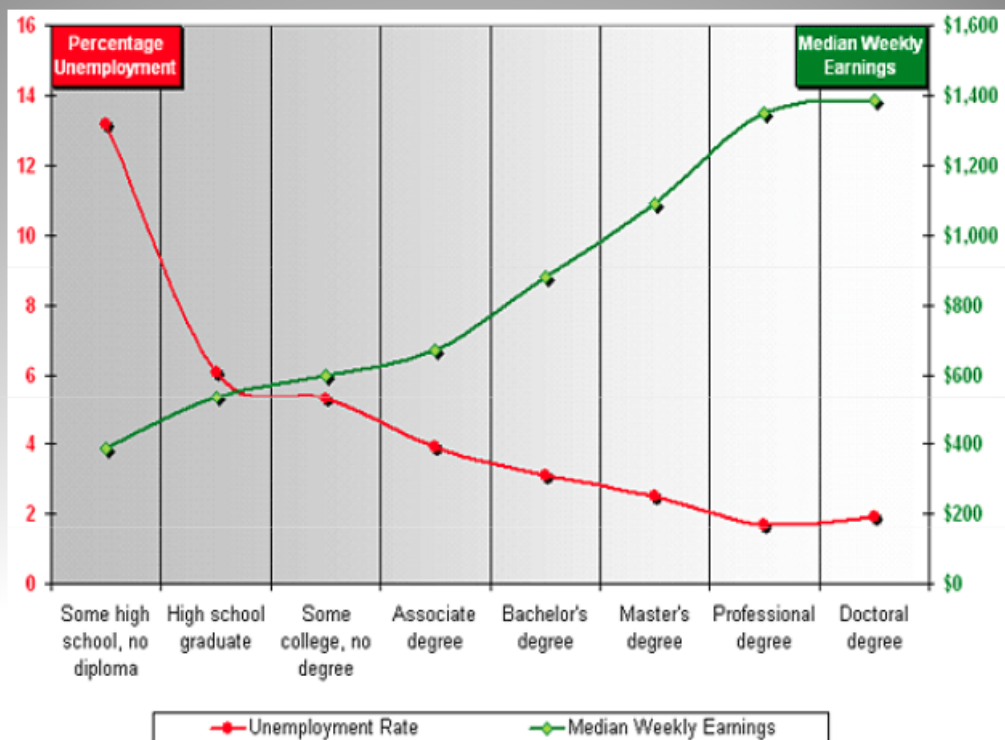


## “Very Important” Skills for New Entrants with Four-Year College Diploma

From Conference  
Board Employer  
Survey



## Why Invest in your Future



## APPENDIX 4

### Top Detailed Occupations: State of Maine (John Dorrer)

There are 12,465 postings available with the current filters applied.

There are 403 unspecified or unclassified postings.

11/18/2011-11/16/2012

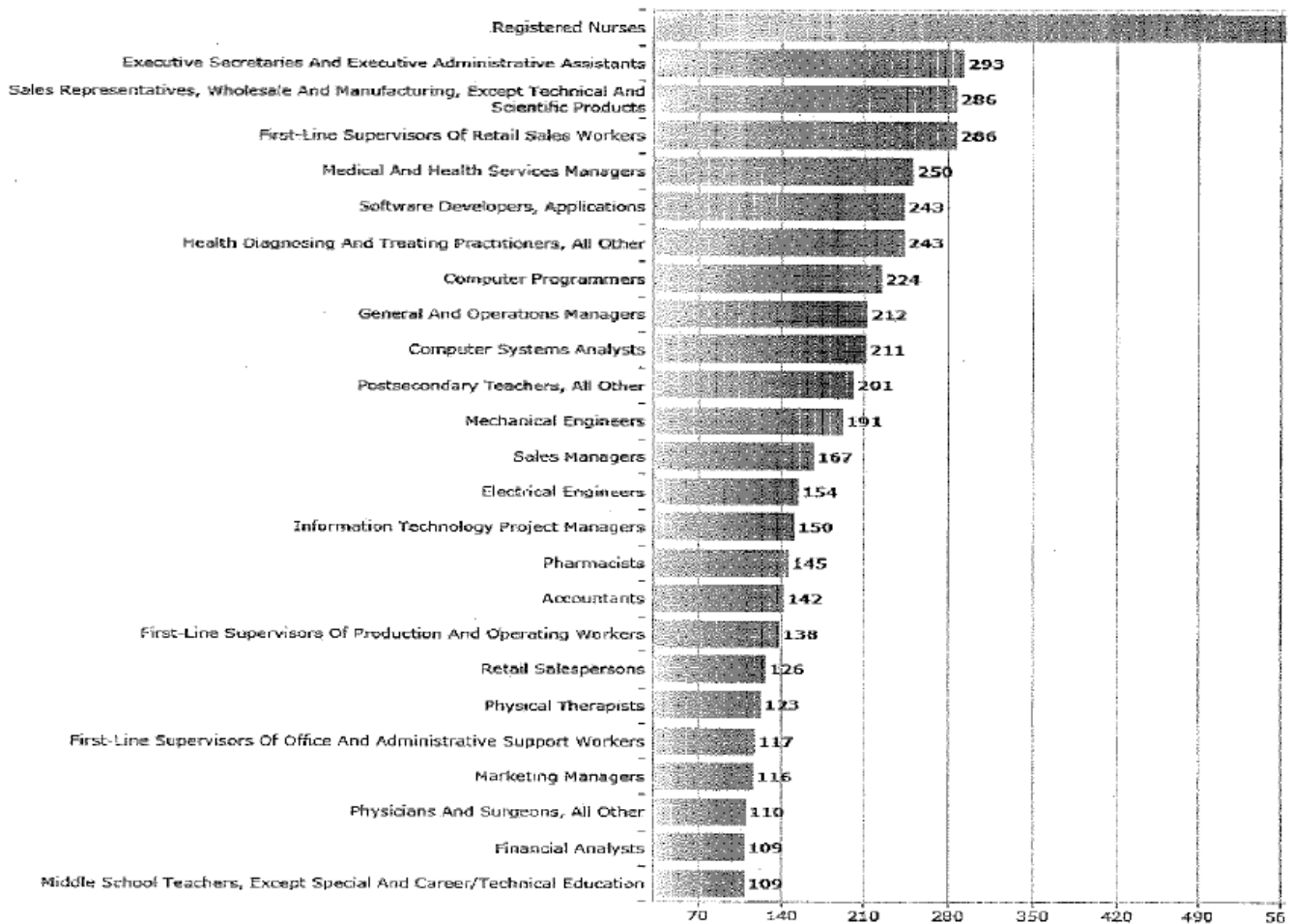
#### Active Selections

Education: Bachelor's Degree

Education: Graduate or Professional Degree

Date: Nov 18, 2011 – Nov 16, 2012

State: Maine





## APPENDIX 5

### Skill Clusters in Demand: State of Maine (John Dorrer)

There are 12,465 postings available with the current filters applied.

There are 0 unspecified or unclassified postings.

11/18/2011-11/16/2012

Active Selections

Education: Bachelor's Degree

Education: Graduate or Professional Degree

Date: Nov 18, 2011 – Nov 16, 2012

State: Maine

