



State Council of Higher Education for Virginia

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State Council of Higher Education for Virginia

Questions to SCHEV from the Committee

- 1) Can we survey Virginia colleges to determine weak skill areas in math and science? What skills are lacking in college freshman that result in them changing majors?
- 2) What percentage of Virginia graduates major in STEM and what percent of graduates in North America major in STEM? Asia? Europe? What are the actual numbers?
- 3) Could we do a survey of students who intended to major in STEM but did not? Why did they switch?
- 4) What is the potential salary difference between STEM majors and non-STEM majors?
- 5) Why is the CSEMS program at CNU so successful?
- 6) How can we allow more professors to do more research? Will this attract more professors in STEM to Virginia?
- 7) How can we receive an update on the peer review faculty pay study?
- 8) What are other states doing to attract research dollars?
- 9) How do Virginia schools compare to other states in attracting federal, state, and private research dollars?



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#1: Student Preparedness/Weaknesses for STEM Work in College

- SCHEV is working on conducting a survey of Virginia institutions; however, staff examined two national surveys conducted by the Chronicle of Higher Education on student preparedness for college-level work, the results of which were released in March 2006
- Staff also examined data from American College Testing (ACT)



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Chronicle Surveys Findings

- The surveys, one aimed at college professors and one aimed at high school teachers, assessed each group's perception of student preparation
- Surveys found a large gap in views of mathematics readiness
- In terms of overall preparation, 84% of faculty members – compared with 65% of teachers – responded that high school graduates are either unprepared or are only somewhat well prepared to pursue a college degree
- Faculty members also reported that students are inadequate writers, have trouble understanding difficult materials, fall short in knowledge in math and science, have poor study habits, and lack motivation



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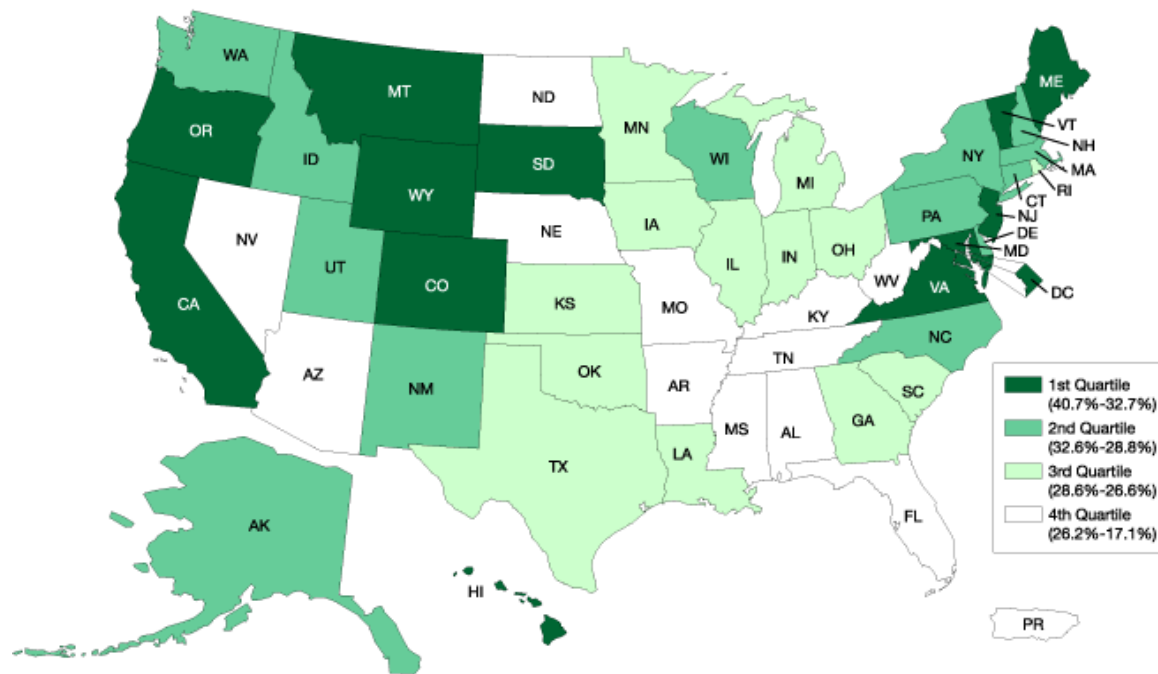
ACT Research Findings

- ACT's research and recommendations are based on the more than 1 million US high school graduates who take the ACT college admission and placement exam each year
- According to ACT, fewer than half of national high school graduates are ready for first-year college math and science

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#2: What percentage of Virginia graduates major in STEM? In North America? Asia? Europe? What are the actual numbers?

S&E degrees as share of higher education degrees conferred: 2000



Source: National Science Foundation from U.S. Department of Education statistics

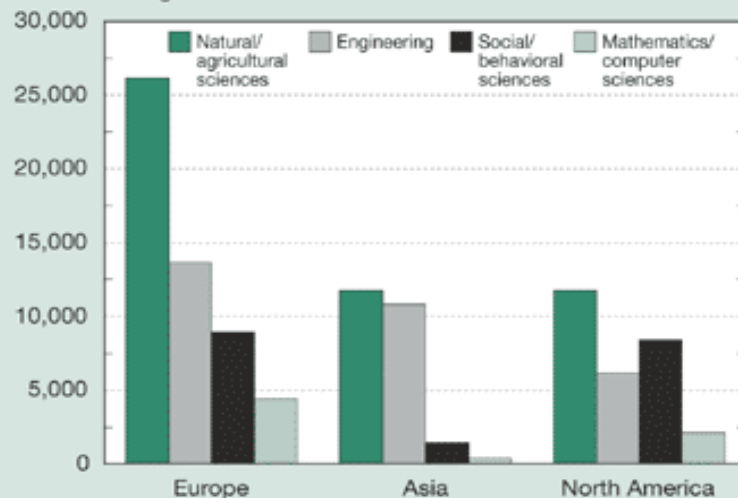


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#2: What percentage of Virginia graduates major in STEM? In North America? Asia? Europe? What are the actual numbers?

Figure 2-36
S&E doctoral degrees in Europe, Asia, and North America, by field: 2000 or most recent year

Number of degrees



NOTES: Natural sciences include physical, biological, earth, atmospheric, and ocean sciences. Asia includes China, India, Japan, South Korea, and Taiwan. Europe includes Western, Central, and Eastern Europe. See appendix table 2-36 for countries/economies included within each region.

SOURCES: Organization for Economic Co-operation and Development, *Education at a Glance 2002*; United Nations Educational, Scientific, and Cultural Organization (UNESCO), UNESCO Institute for Statistics database; and national sources. See appendix table 2-36.

Science & Engineering Indicators – 2004



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#3: Why do undergraduates leave the STEM fields?

- According to the Higher Education Research Institute's 2005 Survey of the American Freshman, the longest running survey of student attitudes and plans for college, approximately 1/3 of all incoming freshman have contemplated a major in a science and engineering field, with most intending to major in a field of natural or social science, and a smaller percentage selecting mathematics, the computer sciences or engineering
- Yet, half of all students who begin in the physical or biological sciences, and 60% of those in mathematics will drop out of these fields by their senior year, compared to the 30% drop out rate in the humanities and the social sciences



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#3: Why do undergraduates leave the STEM fields?

- Talking About Leaving: Why Undergraduates Leave the Sciences, authored by Elaine Seymour and Nancy Hewitt, offers an in-depth report about why students drop out of STEM majors
- Determined the most common reasons offered for switching out of a science, math or engineering major
- In addition, Stanford economist Paul Romer believes that colleges can actively discourage students from majoring in STEM fields or taking additional mathematics and science courses by institutionalizing a process partially designed to “weed out” all but the most committed students



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#4: What is the salary difference between STEM-majors and non-STEM majors?

- According to a report from the Commission on Professionals in Science and Technology, salaries of scientific, technological, engineering and mathematics workers increased about 6% in inflation-adjusted dollars between 1995 and 2005
- This is comparable to salary increases among the entire US workforce
- For both groups, salaries peaked around 2002 and have flattened out or declined slightly since
- The median salary for all workers in 2005 was \$34,000, compared to \$56,500 among all STEM workers
- Among math and computer scientists, the median salary was \$59,000



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#5: Why is the CSEMS program at CNU successful?

- Through a National Science Foundation Computer Science, Engineering, and Math Scholarship (CSEMS) grant, **Christopher Newport University** has been able to significantly increase the number of freshman declaring math as a major from 5 to 22 and the number of students graduating annually with a major in math from 7 to 15
- Program is successful because, in addition to the financial aid, there is a strong mentoring component to the program, providing a strong support network for students



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#6: How can we receive an update on the peer review faculty salary study?

- Language in the 2006-08 Appropriation Act directs SCHEV, in consultation with the Secretary of Education, the Secretary of Finance, and the Chairmen of the House Appropriations Committee and Senate Finance Committee, to review, and if necessary, update institutional peer groups used for assessing the Commonwealth's goal to fund teaching and research faculty at the 60th percentile of peer institutions nationally
- In updating each public college or university's peer group, the Council shall develop a set of peers that is statistically similar to the Virginia institution
- Factors to be used in the assessment of similar institutions may include, but shall not be limited to, the mix of academic programs offered, qualifications for student admissions, and faculty qualifications
- The State Council shall report its findings to the Governor and the Chairmen of the House Appropriations and Senate Finance Committees no later than July 1, 2007 along with an assessment of the impact of faculty salary rankings using the updated peer groups



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#7: How can we allow professors to do more research? Will this attract more professors in STEM to Virginia?

How can we allow professors to do more research?

- The teaching load of faculty is a major determinant in the time faculty have available to conduct research
- A 2002 SCHEV report finds that an over-emphasis on undergraduate education threatens the research capacity of the Commonwealth and the long-term health of undergraduate education
- In addition, adequate capital space and research equipment are critical



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#7: How can we allow professors to do more research? Will this attract more professors in STEM to Virginia?

Will this attract more professors in STEM to Virginia?

- Empirical evidence of job choice is difficult to obtain
- Conversations with university deans and department heads who act as the hiring authority for most faculty positions reveal that teaching load is a major determinant as to whether or not a well-qualified faculty candidate will accept a teaching offer
- Institutions that are able to offer lower teaching loads to faculty are at a competitive advantage in hiring the best faculty



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#8: What are Other States Doing to Attract Research Dollars?

- Identifying research focus areas that attract federal research support
- Attracting and retaining top-notch faculty
- Developing new researchers from within the state
- Growing the space available for faculty to conduct university research



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#9: How do Virginia schools compare to other states in attracting federal, state, and private research dollars?

- Virginia ranks 37th in the nation for research dollars expended per capita by universities
- Virginia ranks 32nd in the nation for federal research dollars per capita by universities
- Virginia ranks 35th in the nation for state, local, and institutional research dollars expended per capita by colleges and universities
- Data is not available on Virginia's rank relative to other states in private research dollars expended per capita
- Despite strong gains in research dollars expended, Virginia's top research universities, Virginia Tech (55th), and UVa (67th), both lost ground relative to other national research institutions in recent years



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QUESTIONS?