

Extrapolating Current Trends in Engineering Technology Education

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Abstract - Most trends in education are financially driven by the lack of funding. In recent years, the University of Southern Mississippi has used both traditional and non traditional methods to compensate for the reduction in State funding. Traditional methods are raising tuition, requiring more external funding, using graduate teaching assistants, and offering more online courses. Nontraditional remedies are outsourcing the food services and bookstore, and closing the University golf course. Universities must downsize to a supportable level, or acquire external funding and endowments. The current trends indicate an economy of scale that gives large universities an economic advantage. Large endowed research institutions composed primarily of research laboratories will have the least funding problems. Most of the financial support for the institution will be through endowments, grants, and tuition. Programs with less outside funding such as fine arts and liberal arts will be kept but with lower paid faculty.

Keywords: tuition, trends, funding, outsourcing, research, grants, hiring

CURRENT TRENDS

Thirty years in engineering technology education at three universities has allowed this professor to observe several important trends. The changes have occurred in two categories, technology driven and financially driven. The technology driven changes are associated with the emergence computer technology and have been well documented. This paper will address the financially driven changes caused primarily by the continued reduction of state funding for education. Many states, including Mississippi, have not been able to support high schools, junior colleges, and universities at former funding levels. The aging population is paying less tax and requiring more state resources for Medicaid, and other aged population expenses. Surprisingly, Mississippi devotes about 60% of its total budget to education – one of the highest percentages in the country.

One trend involves students entering Engineering Technology from high school. A large salary difference exists between science teachers and would-be science teachers commercially employed in the sciences. Thus, the loss of revenue for high school education has greatly affected the availability of high school science teachers. As a result, more science teachers now are not science educated and have emergency certification. Thirty percent of Texas science teachers have emergency certification[1] “With average starting salaries of \$18,000, \$20,000, and \$21,000, respectively, such states as North Dakota, Mississippi, and Maine have found themselves strapped for newcomers, according to a 1996-97 report from the American Federation of Teachers.”[2] Consequently, high school graduates in recent years are often poorly prepared in the sciences.

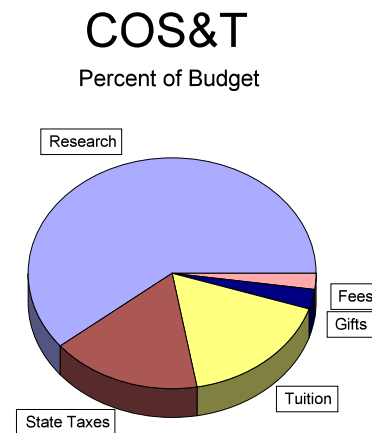
Another university trend involves both the faculty and students. Mississippi is currently attempting to support about 1,010 K-12 schools, 15 community colleges, as well as eight universities. Education funding from the State is dependent on tax revenue which varies with the general economy. Fortunately, Mississippi has a mostly agrarian economy that varies less than industrial economies. Unfortunately, the total economy is small. Thus, the loss of tax revenue during recessions severely dilutes the financial support for education in general and the science topics for engineering technology in particular. To compensate for the loss of funding in recent years, U.S.M. has used both traditional and non traditional methods. Some of the traditional methods are hiring more part-time faculty, requiring

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more external funding from the faculty, using graduate students for teaching, offering more online courses, and increasing faculty work loads. [3] A troubling trend has developed in faculty hiring in Engineering Technology. New doctorates with little or no industrial experience are hired because they demand lower salaries and they are more attractive as principal investigators for grants. One of the strengths of engineering technology has been its applied nature using industrially experienced faculty. Consequently, the trend in Engineering Technology education will probably continue to be toward more outside funding. Although an applied science, Engineering Technology at U.S.M. has acquired its share of funding. Industrially experienced faculty are also removed from education by competition from the commercial sector. Hiring them is expensive and the faculty cross-section is trending toward youth and less experience. Some nontraditional remedies are outsourcing the food services, University security, the bookstore, and closing the break-even golf course. It is clear to the faculty that the financial pressures on U.S.M. and certainly other universities are severe.

Two paths appear to be available for universities; downsize to a tax and tuition supportable level, or acquire more outside funding to sustain the current operation and perhaps even grow. Downsizing is probably a terminal strategy. Downsizing to fewer programs will attract fewer students with fewer faculty and result in fewer options. The only viable strategy is to become more financially independent of tax support through grants, contracts, and endowments. Institutions with large outside funding have lower costs per student and a more capable faculty because of the higher salaries available. The trend in state support and the economies of scale indicate that fewer small universities will survive, particularly if they downsize.

An emerging attractive trend is not requiring class attendance or even classrooms. Online courses are becoming increasingly common and students are coping with them fairly well. The heavily endowed Massachusetts Institute of Technology is now providing free access to online courses if credit is not issued. The web material is available to anyone that wants to learn the course material at MIT's OpenCourseWare at <http://ocw.mit.edu/index.html>. [4] Another financially attractive trend is use of more graduate teaching assistants although their education is marginally ahead of their students. This strategy does reduce expenses and tuition but is probably an ethics issue. Students complain about TA's lack of instructional expertise. Graduate teaching assistants have a responsibility to improve their teaching skills, as all professional educators do. [Garcia, 5] Even with these measures, tuition will probably continue to increase for all universities. This will reduce the tuition advantage that state-supported schools originally had over privately-supported institutions. At U.S.M., the College of Science and Technology (COS&T) now operates more like a total university in the year 2020. The COS&T total annual budget is 59 million of which 36 million(61%) is research, 10 million (17%) state support, 10 million (17%) tuition, 2 million (3%) gifts, and 1 million(2%) fees. Endowments are handled at the University level and have not been included.



EXTRAPOLATION

Like any enterprise, educational institutions face competition pressures. The large endowed research institutions have a competitive advantage because they can provide more income through financial investments and research/contract laboratories. Financial pressures encourage more courses to be taught online with the laboratories taught through computer simulations. These courses will be taught primarily by TA's supervised by research faculty. Most of the financial support for the institution will be through endowments, grants, contracts, and tuition. Programs less able to support themselves with outside funding such as fine arts and liberal arts will be kept but with lower paid faculty. The lack of research funding for fine arts and liberal arts will require them to obtain increased endowment support. Without some outside support, non-essential programs will probably be minimized. Faculty able only to teach and are good at it may be kept at lower salaries with high teaching loads that generate many student credit hours. These faculty are economically justified and will have a viable niche. They will also have the

burden of curriculum development, advisement, and the other activities associated with student management.[Zemsky, 6]

By 2020, the financial pressures will force universities to operate more like businesses. Presidents will be more like CEO's and the faculty will be more like entrepreneurs. Professionally educated managers will probably replace professor/administrators. Competition between universities will be keen as students try to obtain the most education for their tuition dollar. For the next 25 years until the baby boomers pass on, state legislatures will continue to have difficulty supporting both an aged population and higher education with the available taxes. It appears that universities must either develop the endowed research university economic model or be left behind.

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