

# MSU COE: A proposal for COE academic programs to focus upon excellence in hands-on learning, discovery, and engagement

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## Background

The Montana State University Planning Council and Strategic Planning Committee have been at work for over a year on the campus Mission Statement, Core Themes, Vision Statement, and new Strategic Objectives that form the basis of MSU's accreditation report to the Northwest Commission and the outline for a new strategic budget process. Simultaneously, in the context of shrinking state budget allocations for higher education, members of the Board of Regents are openly talking about one of the implications of outcomes-based assessment: *the need to prioritize programs and expenditures*.

It's my assertion that MSU in general--and the College of Engineering in particular--is following a path to academic program *competence*, not a path to *excellence*. Excellence means being recognized regionally and eventually nationally as being "the best" according to some agreed-upon standard.

My decade of observation here at MSU indicates to me that we like the idea of everyone striving for excellence, we talk about becoming excellent, and we like to give all academic programs the opportunity and encouragement to excel. We get uncomfortable whenever we sense that certain academic activities are treated as first-class while other activities are not so favored.

While there is a lot to admire in this egalitarian philosophy, the notion that MSU can ever be excellent at every single academic thing we chose to do is a problem. We have a finite budget, finite faculty, finite time, finite space, finite imagination, and so forth. The result is that MSU produces many academic programs that are *good* and *competent* due to the heroic efforts of our faculty, but I would argue that essentially none of our campus programs are being groomed for *excellence*.

Why try to achieve excellence in some strategic pursuits? Isn't it OK for a state like Montana to accept mere competence? I believe this is a question of sustainability. Like most states throughout the country, Montana has seen a steady move by our legislature to fund as little of higher education as possible, and to tie whatever funds are provided to a measure of the impact on resident students. With current projections indicating that the pool of Montana high school graduates will decline by 20% in the next decade, MSU is on track for fewer resident students and even less state support. This means that our academic competition will increasingly be other universities in our region and beyond—just as it already is for our research competition.

In order to be truly competitive and achieve excellence in our academic programs, reality dictates that we must be able to prioritize our efforts. We need to identify the types of activities for which MSU has an existing propensity, a niche, and a unique competitive advantage, and exploit and build upon these advantages. We must develop the discipline to identify the specific activities to be supported for excellence, the activities just to be supported for competence, and the activities that we will simply choose not to do at all.

I actually see this situation as an opportunity for COE. We currently have academic programs that are truly good and competent at producing quality graduates who get hired and work effectively on the job—and that’s something to be proud about. However, I think we can and should aspire to have aspects of our academic programs that do not merely demonstrate competence, but for which we are recognized regionally and eventually nationally as being *exceptionally* good.

### Are we poised to be great?

I recently re-read the book “Good to Great” (2001), which describes a set of companies that had gone from being merely good and competent to being excellent for a sustained period of time. Among the key findings was that all outstanding organizations combine three attributes:

- (1) Identifying what they are deeply passionate about. They don’t just pick something using a focus group. The leadership decides what direction to go and then separates those who share the passion from those who don’t. Over time, the organization attracts those who share the passion and sheds those who do not.
- (2) Identifying the specific areas in which they can be the *best in the world*. Again, not areas that they can merely be competent, but areas in which they can achieve world-class performance. The organization needs to look clearly and objectively at its unique strengths and its position with respect to potential competitors. Many tactical “opportunities” are ignored to focus on the key strengths.
- (3) Identifying the single denominator to generate sustained cash flow and profitability. In other words, it isn’t enough to just be passionate about something, you also have to have a business plan that will excite customers and build confidence with constituents.

Although the three attributes were derived by examining successful companies, I believe the same principles apply to our academic institution.

I asked myself: is there something that I see COE faculty consistently being passionate about? My answer is yes: it is *hands-on laboratory learning and research*, and this is reflected in both our undergraduate and graduate curricula.

Work in COE at MSU obviously relies upon theory, but I believe our real strength and passion is in actually building devices and systems. Our professors are excited when they are in the lab working with students to study, describe, and build things. And we have a lot of students who grew up on ranches and in small towns and haven’t forgotten how to use their brains to guide their hands to fix problems and to tinker around. This is a key competitive advantage for Montana compared to the student population elsewhere in the country. Moreover, the attitude of Montanans seems to be supportive of hands-on learning and innovation. This past year we had a high school FIRST robotics team from Ronan win the national competition, a high school student from Billings was featured at the White House Science Fair, and a new non-profit venture in Bozeman has established a fully-equipped student robotics lab on South Rouse, the “Botcave”.

Then I asked myself: is there something in this passion that MSU COE could conceivably be the best in the world at? I believe the answer is yes. We could decide to focus on the hands-on laboratory experience of our students, a sustained, hands-on project emphasis in our curriculum, AND a commitment to reach the top echelon in engineering design/build competitions. Our recent improbable

student success in the NASA Lunabotics competition, the human-powered vehicle event, SSEL's launch of Montana's first satellite, and even Engineers Without Borders are all encouraging in this regard.

Finally, I wondered if there can be an economic model to support this? Again, I truly believe the answer is yes. We would tune our student (and faculty) recruitment to the concept of hands-on laboratory learning and research, and show that we are the regional and ultimately the national leader in this style of engineering education. We would need to get external sponsorship support and local institutional buy-in. Securing and maintaining that external and internal support is hard work, but because this is something our faculty *really* feel passionate about, the work would be worth it.

### **A prioritization example**

How would we use these ideas to help with our budget prioritization? Consider the recent administrative decision seeking proposals for expanded on-line instruction and on-line programs.

On-line education is important for many reasons. But is it an area in which the MSU College of Engineering can arguably achieve and sustain excellence? Based on the reasoning above, I would argue that on-line education is an example of an area in which we should only aim for competence, not excellence, when making special budget investments.

- (1) *Do we have many faculty who are deeply passionate about on-line programs?* I would assert that the answer is *no*. Individuals use on-line methods for improving student learning, but I don't sense lots of passionate proponents broadly across our college.
- (2) *Can we see a way for MSU to be recognized as the best in the world (or even the best in our region) at on-line programs?* Again, I feel the answer is no. We are way behind the leaders in this field. North Dakota, for example, has had on-line engineering degrees for many years already. Commercial providers like University of Phoenix and Kaplan University have already bet their futures and invested heavily in on-line coursework, too. I think we should leave on-line strength and innovation to programs located in places that people *don't want to visit*, while places that people *DO* want to visit (like Bozeman) aim for the face-to-face and hands-on experience.
- (3) *Is there a way for MSU to make money doing on-line education?* Given the small population in this state and the aforementioned head start of other providers, I am highly skeptical of the marginal profit potential for MSU on-line programs.

This example involving on-line education was chosen simply to demonstrate how COE might evaluate and prioritize strategic investments. Our investment test would evaluate a proposal on the basis of faculty passion, potential for achieving best-in-the-world status, and financial sustainability. If we can't make a convincing argument in all three attributes, we need to be firm in our resolve not to squander our limited resources.

### **Establishing our academic niche**

Besides a passion for hands-on learning, does MSU have unique program features that separate us from our potential academic competitors? Without a doubt, our most significant innate feature is our location. Bozeman is a place where literally a million non-resident people come each year for business and "hands-on" vacations doing fishing, skiing, rafting, hunting, hiking, camping, biking, sight-seeing, ice climbing, kayaking, etc. This is a place that people like to come and visit. One of MSU's more successful

campus programs is the Masters of Science in Science Education, which uses on-line study as a way to “hook” hundreds of MSSE students into coming to Bozeman each summer to complete their hands-on and face-to-face projects and instruction—and spend some relaxing time in the clean mountain air. I think THAT’S a potential model to exploit.

In COE we have a variety of pretty unique physical facilities, such as the Montana Microfabrication Facility, the Cold Regions lab, the WTI driving simulators, and a dozen or more well-equipped instructional laboratories. We can exploit and emphasize the face-to-face and hands-on instructional opportunities.

So, given the choice between (a) funding more experimental on-line programs or (b) supporting our hands-on physical instructional lab facilities, I would argue that the face-to-face strength of MSU could easily be enhanced and lead us from being good to being great.

### **Conclusion**

The time is right for COE to allocate new resources and reallocate existing resources with the express goal of academic program excellence in key niches, such as hands-on, face-to-face laboratory learning. The process may be time-consuming and potentially wrenching, but I believe it is a key to the long-term growth and sustainability of our College.