A JOURNAL OF EDUCATION, POLITICS, AND CULTURE | FOUNDED 1991

MONTANA Professor

Volume 24, Number 1

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Montana Professor is published twice each academic year—Fall and Spring—by Montana Professor, Inc., a non-profit Montana corporation. The journal receives the bulk of its financial support from the University of Montana and Montana State University and is supplied free of charge to active and retired members of the faculties and academic administrations of the two universities, the state's tribal colleges, the Office of the Commissioner of Higher Education, the Board of Regents of the Montana University System, the Office of the Governor, and the members of the Montana Legislature. *Montana Professor* is a forum for those involved in higher education to discuss issues of common interest and concern. The journal does not publish specialized discipline-specific scholarly research.

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MSU Publications and Graphics
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www.montana.edu/communications

Photo, front cover: Phlox, No Man Peak, Madison range by Kristen Drumheller

Photo, back cover: Black bear in Yellowstone Park by Kelly Gorham

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Philip Gaines, PhD
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Welcome to the latest number of *Montana Professor.* This issue pays particular attention to the matter of performance-based funding in higher education, a model which rewards campuses for achievement of specific outcomes—usually associated with rates of student retention and graduation. Prof. Marvin Lansverk from MSU Bozeman gives a quasi-editorialized overview of the issue from a Montana perspective in **Critical Issues in Higher Education**. In the **MP Interview**, Deputy Commissioner of Higher Education Tyler Trevor addresses questions of the kind that concern—and in many cases trouble—members of the MUS professoriate.

In **Focus on Teaching**, Regents Professor and 2009 Baccalaureate Colleges U.S. Professor of the Year Rob Thomas reflects on the past, present, and future of Experience One, the innovative and effective block scheduling curriculum at UM Western.

Current Research features contributions from scholars in Education and Bio-Energy: Prof. Traci O'Neill from Montana Tech shares findings from a recent study on student academic motivation, and Profs. Randy Maglinao and Md. Joynal Abedin explain their work on producing more efficient jet fuel.

This issues also features reports on three **New Programs** focusing on school and community outreach: MSU Billings's multi-tiered system of support partnership with Billings schools to assist in learning outcomes for challenging elementary school populations, Montana Tech's BRIC initiative which mentors school teachers in bringing research into the classroom, and the BRAVO! program at the UM Missoula, which teaches children acting skills for application to real-life issues.

Finally, let me invite you to submit ideas to *MP*. My recent editorial approach has been to commission contributions on specific topics, but I would like to ask for abstracts of pieces that you would like to submit to the journal—whether it's current research, a particular focus on teaching, or a critical issue in higher education. Please send a 200-300 word abstract to me at gaines@montana.edu. Also, if you have an idea for a special issue or a focus for an issue, let me know.

Philip Gaines

YOU ARE INVITED TO SEND ABSTRACTS OF PIECES THAT YOU WOULD LIKE TO SUBMIT TO THE JOURNAL—WHETHER IT'S CURRENT RESEARCH, A PARTICULAR FOCUS ON TEACHING, OR A CRITICAL ISSUE IN HIGHER EDUCATION. PLEASE SEND A 200-300 WORD ABSTRACT TO ME AT GAINES@MONTANA.EDU.

PERFORMANCE BASED FUNDING: A BRIEF PERSONAL HISTORY

Marvin Lansverk PhD,
Professor of English, Montana State University

Marvin Lansverk

The national experiment with Performance Based Funding has finally come to the Montana University System in earnest. Though implemented for years in other states with mixed success (notably, Tennessee, Ohio, and Kansas, and now many others), Montana has joined the bandwagon. With what success remains to be seen, but as with many major initiatives in our complex and diverse university system in these polarized political times, seeing clearly just what is at stake is important if we are to achieve our common goals of continuing to improve Montana's higher education opportunities. Mutual understanding is important, so that at least we know what each other is talking about, because different constituencies approach many issues in higher education in vastly different ways. What follows, then, is a brief attempt to sort out the history, the various constituencies involved, the promise, and the problems with Performance Based Funding, so that no matter which direction you approach this from, you will be better able to read between the lines of the language of its promoters and detractors.

I remember the first time I encountered the concept of performance based funding. It was at a Board of Regents meeting in Billings, five years ago, Sept 23, 2009. Dennis Jones, of NCHEMS (National Center for Higher Education Management Systems) had been hired as a consultant by our Board of Regents and he was making a presentation on the second day of the meeting, as he continued to do throughout the next couple years. Many of his Power Point slides set Montana statistics against national data—something NCHEMS has been doing for years. NCHEMS was an early player in creating and using new statistical metrics for understanding trends in higher education, especially trends in population and funding, to aid in making data driven decisions, akin to the increased use of Big Data in baseball—fascinating, though I'm not sure the movie version will ever compete with *Moneyball*. What really grabbed my attention though, were the set of recommendations at the end of Dennis Jones' presentation. It was an eclectic mix of suggestions to gain efficiencies in higher education, especially in an era of decreased public funding. Among the ideas was to begin employing some percentage of performance based funding mechanisms when state money was distributed across campuses. Another suggestion for increasing efficiency—and one I remember very well, since I was attending the Board of Regents meeting in the first place because of my role as Chair-Elect of the Montana State University Faculty Senate—was to reduce wasted time and duplication by not having faculty participate in meetings such as the one I was attending. Jones explained that valuable faculty time shouldn't be used to participate in, or monitor administrative decision making: that's what administrators were paid for in the first place. Another suggestion for Next Generation higher education, among others, was to move more to an educational system where highly trained faculty spent less time in the classroom and more time just designing curriculum, which could then be delivered by T.A.'s and other much lower paid adjunct faculty, under the supervision of tenure track faculty who would be consultants, more than hands-on teachers. I'm not sure how the research component of our job fit into his views.

While Dennis Jones was making his presentation, I remember going to the NCEHMS website to see who he was. As their site explained, NCHEMS "is a private nonprofit (501)(c)(3) organization whose mission is to improve strategic decision making in higher education for states and institutions in the United States and abroad." And on the "President" page, Mr. Jones' background was described; he was trained as an efficiency engineer, with a MS in management engineering. It made sense. Efficiency is an important goal in any complex system: "Education for Efficiency" actually used to be the MSU university motto, though MSU abandoned it years ago as the institution grew and became more than an agricultural and engineering school. Fortunately, I remember thinking, by Board of Regents policy, the Montana Univer-

sity System is committed to principles of *shared governance:* even when inefficient from one point of view (I could have been grading essays instead of attending a two day Board of Regents meeting), our own BOR has long recognized that since universities aren't top down hierarchical corporations, our education institutions need cooperative participation from all stakeholders in order to optimize decision making —the very definition of shared governance. Optimization vs. efficiency. I needed to think more about that.

But what about this performance based funding idea? Might it play a useful role in our future funding processes? We were about to find out. The idea was soon championed by, then, new regent Todd Buchanan, who in his early years on the Board, created a process that came to be known ambitiously as "Reinventing the University:" it was a Regents' Workgroup, created in 2009, to explore a number of ways to best reorganize our university system for the next century. Eventually, I was appointed, along with a couple other faculty representatives to one of this group's subcommittees, and after a few year's work, which included more meetings with NCHEMS consultant, Dennis Jones, the result evolved into what the regents were by then calling their "Success Agenda," which was adopted and made a part of the BOR's strategic plan. The ten-point Success Agenda captured a number of the Regents' existing priorities, and number eight on the list was: "Performance-Based Funding," itself comprised of three elements: "Align targeted outcomes with institutional type through purposeful allocation of resources based on programming type. Associate achievement in key performance areas with aspects of funding (allocation model). Define, measure, and reward success by institution."

It was done. PBF was now part of the Montana University System strategic plan. But what exactly was it? Soon after the Success Agenda was adopted, the Montana State University Faculty Senate appointed a committee to ask just that. Being comprised of research faculty, they did what research faculty do, and reviewed the published, peer-reviewed literature on performance based funding, eventually summarizing their findings at the Board of Regents meeting in Missoula, in November 2010, in a report included below. I participated on this MSU Faculty Senate committee and used the opportunity to read up on the subject. One of the difficulties we found was that much of what was available generally on the web (as opposed to the academic literature) was the product of promoters of the concept. What we were looking for was hard data on results, and a hard boiled assessment of the promises and problems. And fortunately, because of the longstanding, ongoing experiments with PBF in other states, useful data is emerging that should continue to help Montana shape its version.

Because the report captured many elements of what continue to shape our discussion of PBF, I include it here.

WHAT FOLLOWS . . . IS A BRIEF ATTEMPT TO SORT OUT THE HISTORY, THE VARIOUS CONSTITUENCIES INVOLVED, THE PROMISE, AND THE PROBLEMS WITH PERFORMANCE BASED FUNDING, SO THAT NO MATTER WHICH DIRECTION YOU APPROACH THIS FROM, YOU WILL BE BETTER ABLE TO READ BETWEEN THE LINES OF THE LANGUAGE OF ITS PROMOTERS AND DETRACTORS.

To: Montana Board of Regents
Commissioner of Higher Education
From: MSU Bozeman Performance Based Funding Faculty Senate Task Force
RE: Development of PBF Proposals
Date: November 19, 2010

We hope this document will help both the Board of Regents and OCHE in their continued investigations into PBF models and in the development of a PBF plan best suited to the MUS. This is not meant as a comprehensive proposal or a polished "white paper" representing the views of the MSU Bozeman faculty. Rather, it is meant as a working document that tries to bring together current data on PBF and our thinking about what approach can best be implemented. It is offered in the spirit of constructive shared governance, attempting to combine peer reviewed academic analyses, national data, and best practices gleaned from the many experiments with performance based funding in other states and countries over the past ten years.

IN 2003, FORTY-FOUR STATES HAD ADOPTED SOME FORM OF PERFORMANCE REPORTING, BUDGETING, AND/OR FUNDING. HOWEVER, RECENT RESEARCH HAS SHOWN THAT THESE POLICY TOOLS HAVE NOT RESULTED IN A CORRESPONDING INCREASE IN INSTITUTIONAL PERFORMANCE.

Recent Literature on Performance Based Funding/Accountability

Performance based accountability grew at higher education institutions during the 1990's and into the 2000's. In 2003, forty-four states had adopted some form of performance reporting, budgeting, and/or funding. However, recent research has shown that these policy tools have not resulted in a corresponding increase in institutional performance. A survey conducted in 2003, found a decline in performance budgeting and performance funding in the US, but an increase in performance reporting (Burke & Minassians, 2003). Early recommendations for performance reporting, budgeting, and funding included allowing public colleges and universities to choose a few indicators that reflect their special goals or missions as well as having some state-wide common indicators to reflect shared goals (Burke & Minassians, 2002). Most states with performance based funding/budgeting link less than 6% of the budget to performance and punitive measures are rare (Goldstein, 2005). Two research articles published in the past two years are especially illustrative of the outcomes of performance based funding/budgeting. A longitudinal study of data from 1997 to 2007 at 467 institutions found that states adopting performance-based accountability did not see an increase in institutional performance. (Shin, 2010). Another longitudinal study using data over 12 years, found that strong state control in areas such as performance based funding did not increase graduation rates (Volkwein & Tandberg, 2008). Shin notes that institutional characteristics explain performance and suggests that policy-makers work to change those factors that have a more significant impact on performance, such as tuition rates for incoming students, instructional expenditures per student, and student-faculty ratio.

Areas of stakeholder agreement

The following are areas where we believe there is substantial agreement among the various stakeholders in the PBF discussions. We offer them here to aid future discussions.

1. Serving the students and families of Montana is a top priority.
2. We understand the vital importance of making the most of limited state resources; and the MUS efficiency ratings already show that we are among the best in the nation at doing so.
3. We also understand the importance of continuing to make the case to the public that we are indeed good stewards of state resources.
4. It is important that any PBF proposal be sensitive to varying individual missions of the different units.
5. Thus, it is critical that performance measures for MSU-Bozeman also include those that accurately reflect the value of the research and creative mission of the university. This mission includes the *creation of knowledge* as well as the creative engagement of our student in the research enterprise. Our faculty includes those who do pure and applied scientific research as well as those whose focus is artistic creativity. Our students are unique in having the opportunity to learn first-hand how knowledge and works of art are created. This is an important reason why many of our students come to this institution and it is the force that propels the best of them into creative careers of their own.
6. We recognized the importance of unit-driven prioritization of programs. But prioritization must also take account of the unique missions of the various units. While we can't all do everything, nevertheless, the mission of the comprehensive universities is by definition *comprehensive* (we are not just large poly-technical institutes). This said, targeting some programs for critical investment and growth, while pruning or eliminating others in decline, is and should be an ongoing and process.
7. Substantive program review is the only rational way to determine what should grow and what should go. All units need to do a better job at this and demonstrate to stakeholders that it is being done well. Performing the reviews and making decisions based on them is the job of the academic units. Ensuring that it is done adequately is the job of the regents. This also points to the need for more discussion of the concept of duplication. What exactly does duplication mean? What is necessary duplication? What is unnecessary? What does duplication mean in the context of the online environment?

8. Open discussion of the merits of PBF and any specific proposals, needs to begin now and will need to continue into the indefinite future. Such discussion will require rich information flow as the implementation proposal develops, so that faculty and the units can adequately examine it. As the BOR's own Success Agenda requires, there must be time for adequate consultation with all stakeholders.
9. Any PBF model, or attention to the allocation model in general, should focus on whole university budgets, and not just the academic side; in fact, protecting the academic core mission should be an absolute priority. Thus, administration and support expenditures must also be pruned where possible and efficiency encouraged at every level.
10. In this national/international environment, we must continue to find ways to encourage, and not discourage interdisciplinary interaction.
11. In the development of any PBF proposal, we must try our best to anticipate negative consequences and avoid unforeseen consequences once they become apparent.
12. We must take advantage of existing studies of PBF, recognizing the successes *and failures* in the implementation of PBF elsewhere. Since other states have tried this for a number of years, we need to learn from their successes and their mistakes.
13. It is incumbent upon us to try to follow best practices in PFB, and its implementation, taking advantage of the advice and knowledge of various authoritative sources of information, including the Association of Governing Boards (AGB), The American Association of University Professors (AAUP), and the examination of university funding models by scholars in the field of higher education administration.
14. As OCHE already seems to be doing through its participation in the national data standards group, any performance metrics used cannot be only the longstanding, convenient, blunt instruments often used in the past, but adhere to the best national standards. In other words, decisions must be based on good data, not just easily accessible or "cheap" data. In addition, collection of data, including on various completion measures, must be done before any attempts are made to change completion rates. We need to have a baseline from which to measure our progress.
15. The AGB has many best practice methods for taking better advantage of cost data (among other things). And best practices often emphasize the importance of putting resources into collecting this data and then making it available to the units, with mandates that it must be used in decision making. Best practices also warn boards against encroaching on administrative and institutional prerogatives in using these data.
16. Any PBF budget allocation model must be able to take into account and incentivize *quality* as well as quantity.
17. A full discussion of PBF should include a discussion of the vision we all have for the MUS in the near, middle and long term.
18. As part of this, the *vision* of the university that is embedded in the NCHEMS specific recommendations and their implications, should be openly debated, since no budget proposals are completely neutral; all budget proposals are based on and ultimately impact vision.

Preliminary Suggestions for PBF Proposal:

1. For the sake of clarity, PBF proposals should be separated from "reallocation" proposals also under development and discussion.
2. The MUS should follow the national best practices which strongly suggest using the version of Performance Based Funding known more specifically as "Performance Based Reporting."
   a. Sharing information among institutions on strategies to increase graduation rates should be encouraged.
   b. Making institutional graduation rates and other agreed upon metrics transparent and widely available to the citizens of Montana should become standard practice.
3. As part of a Performance Based Reporting regime, units should set goals, and regents should then hold institutions accountable.

THERE ARE ALREADY SIGNIFICANT PERFORMANCE INCENTIVES IN PLACE THROUGHOUT THE UNIVERSITY SYSTEM. THESE SHOULD BE STUDIED, WELL UNDERSTOOD, WELL ARTICULATED, AND POSSIBLY ENHANCED BEFORE ATTEMPTING ADDITIONAL REFORMS.

4. Regents should also incentivize (i.e., mandate) that institutions improve and/or develop real, substantive, data driven **program reviews.** Regents might also identify other areas to incentivize units to improve, including better advising, better evaluation of teaching, etc.
5. As an experiment, a 1% incentive slice (preferable consisting of new money) should be made available in the MUS budget. Most importantly, it should not be aimed at one single metric (e.g., retention rates), but should somehow reflect unique missions of the units.
   a. Furthermore, the monies from this incentive slice should be distributed not at the unit level, but at the UM/MUS level, for presidents to subsequently allocate, based on internal measures of progress.
   b. Ideally, any performance slice would also be tied to **accreditation** incentives already built into the system, which are well institutionalized, and which themselves focus on outcomes based assessment.
   c. The MUS should explore the use of "performance based grants" as well, even down to the level of individual faculty. Too often, PBF incentive programs don't reach those whose behavior is directly responsible performance improvements.
   d. The incentive slice should not be larger than 1% to avoid deleterious effects of "whipsawing" and budget instability among the MUS units that will impede effective strategic planning.
6. In the longer term, the regents might explore incentivizing the use of benchmarking, perhaps down to the department level, in the case of the research institutions. This version of PBF, where departments identify other departments at other institutions to compare themselves against, has shown to have great promise, nationally. One advantage of this method, is that it allows for performance measures to be individualized. It also helps ensure that quality is still taken into account. Colorado State said their system has employed this method with great success.

Miscellaneous other observations:

1. Six year graduation rates, even four year graduation rates, are a problematic metric for a number of reasons. First, by definition, they are a lagging indicator. Furthermore, if graduation rates are used, they must be assessed outside of individual institutions, since many students complete college but not necessarily at a single institution.
   a. Graduation or retention rates alone cannot capture mission differences, such as selectivity, special programs, student learning outcomes, student intentions in the first place, or differences in access, including financial factors, all of which are important determinants of graduation and retention rates.
2. Although well meaning, some attempts at implementing PBF nationwide have led to an encroachment by boards into the academic purviews (AAUP "areas of primary responsibility"; AGB best practices) long accepted to be the job of administration and faculty.
3. There are already significant performance incentives in place throughout the university system. These should be studied, well understood, well articulated, and possibly enhanced before attempting additional reforms.
   a. Large institutional incentives already exist for improving retention. Adding additional small institutional incentives to existing ones is more symbolic than practical.

Citations:

The citations of these articles and brief summaries of the most recent research studies follow.

1. Burke, J. & Minassians, H. (2002). Reporting indicators: What do they indicate? In J. Burke & Minassians, H. (Eds.) Reporting Higher Education results: Missing links in the performance chain. *New Directions for Institutional Research, 116*, 33-58. Authors wrote about indicators being used by institutions for performance accountability. They found increased emphasis on total enrollments, student diversity, tuition and fees, financial aid, and access. The authors made recommendations which included allowing public colleges

and universities to choose a few indicators that reflect their special goals or missions as well as having some state-wide common indicators to reflect shared goals.
2. Burke, J., & Minassians, H. *Performance Reporting: "Real" Accountability or Accountability "Lite." Seventh Annual Survey 2003*. The Nelson A. Rockefeller Institute of Government. Conducted a survey in 2003 and found a decline in performance budgeting and performance funding in states, but an increase in performance reporting.
3. Curtis, John. (2007). Director of Research and Public Policy American Association of University Professors, Washington, DC. "A Faculty Perspective on Accountability." Presentation to the Pennsylvania State Conference of the American Association of University Professors College Misericordia, May 5. [Power Point]
4. General Accounting Office report (GAO-03-568), College Completion--Additional Efforts Could Help Education With its Completion Goals. United States General Accounting Office Report to Congressional Requesters, May 2003. GAO-03-568, a report to the Ranking Minority Members, Committee on Health, Education, Labor, and Pensions, United States Senate, and Committee on Education and the Workforce, House of Representatives. More than half of all students who enrolled in a 4-year college completed a bachelor's degree within 6 years. Students were less likely to complete if neither parent had completed a degree, they were black, they worked 20 or more hours per week, or they transferred to another college. Students had a greater likelihood of completing if they were continuously enrolled, attended full-time, or had more rigorous high school curriculum... States are beginning to hold colleges accountable for retaining and graduating their students, and [the US Department of] Education has been discussing this with the higher education community. Many states are publishing retention and graduation rates for their colleges, and some have tied performance in these areas to funding. According to [the US Department of] Education, providing information on colleges' retention and graduation performance can help prospective students make informed decisions. However, the measure used by [the US Department of] Education may not fully reflect an institution's performance because institutional goals and missions are not captured in the measure.
5. Goldstein, L. (2005). *College and University Budgeting: An introduction for faculty and academic administrators*. Washington, D.C: National Association for College and University Business Officers, Publishers. This book was written for faculty and academic administrators and is thorough coverage of college and university budgeting and resource allocation.
6. Hauptman, Arthur. (2005). "Performance-Based Funding in Higher Education." Financing Reforms for Tertiary Education in the Knowledge Economy, Seoul, Korea.[Power Point]
7. Shin, J. (2010). Impacts of performance-based accountability on institutional performance in the U.S. *Higher Education, 60*, 47-68. Shin analyzed Integrated Postsecondary Education Data Systems (IPEDS) data from 467 higher education research universities, masters institutions, and liberal arts colleges across the U.S. He examined variable outcomes on teaching (graduation rates) and research (external research funding) at these institutions. The main finding of this study was that states which had adopted performance-based accountability did not see a noticeable increase in performance. Variables that did impact graduation rates included faculty-student ratio, instructional expenditures per student, incoming student achievement, in-state tuition rates, and dorm facilities. Variables impacting research included institutional mission, size of faculty, graduate programs, and staff devoted to research.
8. Volkwein, J. F., & Tandberg, D. A. (2008). Measuring up: Examining, the connections among state structural characteristics, regulatory practices, and performance. *Research in Higher Education, 49*, 180–197. Volkwein & Tandberg used data from the state report cards on higher education outcomes (*Measuring Up*) from the years 2000, 2002, 2004, & 2006 to examine the improvement in state level performance indicators over time. The study looked at the outcomes of 1) Affordability; 2) Benefits; 3) Completion; 4) Participation; and 5) Preparation. Using advanced statistical techniques, the authors found that state

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THE LAST NORMAL SCHOOL

Robert C. Thomas, PhD
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Robert C. Thomas

UM Western in Dillon

Seeds of change

Authentic experiences are at the heart of learning, yet we struggle to incorporate them into our classroom teaching. The roots of experiential learning are as old as our species and are not exclusive to humans. For well over 200,000 years, anatomically modern humans have learned through experience, aided by mentors. Sometime around the 5th century, monastic schools in the Latin west starting using lecture as the primary method of teaching, removing the student from direct experience and giving educational authority to the person behind the lectern. By the time the first modern universities appeared in medieval times, the approach was adopted as central to higher education, and experiential learning was relegated to the so-called learned professions or trades. Fast-forward to the 21st century, and the lecture method is still central to a university education.[1]

The lasting power of the lecture raises the question: Is it still working? I think most of us who teach for a living think it has its use, but my email inbox tells me there is a robust industry forming around the need to compensate for a system that is not working for many students. The incessant ads tell me I can blend, flip, click, and map students into engagement with my lectures. Some universities hide the failings of our medieval system with "beer and circus," while others celebrate it by providing free video lectures through Massive Open Online Courses (MOOCs). Even if the causes of our difficulties are poorly understood or are unjustified perceptions, we can ill afford to sit back and ignore that higher education is changing.[2]

Change at Montana Western

If innovation is born of necessity, we were in dire need by the end of the 20th century. Founded in 1893, the Montana State Normal School was established as a center for training teachers. It remained a normal school well after others in the country had evolved into full-service universities, leaving it under-enrolled and vulnerable to closure. Our staffing was so limited by the 1990s that many professors had to teach all of the classes related to their disciplines and some taught well beyond their disciplines.

In an attempt to find a niche using our meager resources, a few faculty and administrators began searching for ways to distinguish the campus based on how we educated students, rather than through degrees we couldn't afford to offer. We integrated disciplines to maximize our resources and create interdisciplinary liberal arts degrees and began transforming the last normal school into an *experiential learning* university.

In a world where bigger is perceived to be better, Montana Western's greatest weakness, its small size, turned out to be its greatest strength. In order to become an experiential learning campus, we realized that in addition to small class sizes, we needed uninterrupted blocks of time. Like most universities, our schedule was set up for 50-minute lectures. We experimented with longer time blocks within the semester, but it created scheduling conflicts and so we decided to pursue the total-immersion scheduling model pioneered by Colorado College. What emerged was arguably one of the greatest experiments in American public higher education in recent times: Experience One.[3]

Suffice it to say that Experience One did not happen overnight. An idea that was born as early as 1995 was implemented campus wide in 2005 but only after we showed it could work with a pilot program supported by a prestigious Fund for the Improvement of Post-Secondary Education (FIPSE) grant.[4] Resistance to change came from everywhere, culminating in a low point we call "Black Tuesday," but we overcame the obstacles and used the criticism to make improvements.[5]

How does Experience One work?

We use Experience One at Montana Western to engage students in authentic practice in the discipline. The new normal consists of students taking and faculty teaching the majority of their classes one at a time. The typical class meets five days a week for a

minimum of three hours a day over 18 instructional days. There is flexibility in how class time is distributed to accommodate creative pedagogies, fieldwork, and travel—including frequent international travel. Most students take four 4-credit classes per semester for a total of 16 credits, increasing the percentage of full-time students on campus and improving their chances of graduating in a timely manner.[6]

The majority of classes are structured in blocks, but flexible scheduling allows for variable needs. Some classes require long-term skills development and are scheduled in the evenings for the entire semester. Some courses are linked over two blocks and others are offered on weekends. Many of the continuing education and online courses are taught over multiple blocks to accommodate off-campus and working students. The goal is to eliminate scheduling barriers to teaching and learning whenever possible.

Like most universities, tenure-line professors at Montana Western are required to engage in scholarly activities. This can be difficult at teaching-centered universities with standard scheduling, but with Experience One we meet our 24-credit annual teaching load through three blocks per semester, leaving two blocks per year for research, grant writing, course development and other professional development activities. Since many of us include undergraduate students in our research activities, we are altering our official expectations or unit standards to reflect the importance of inclusion.

Examples of how it works

Experience One works all across the curriculum, but I can best speak to my own experience. As a geoscientist, I teach most of my classes in the field and engage my students in authentic practice in the discipline. Winter courses are taught in a classroom, but I employ the same philosophy. Each class produces a product for public consumption as the capstone experience, such as environmental assessment reports, landscape restoration plans, and educational brochures. A recent project on the geologic history of the Dillon area resulted in a professional booklet that is available for free at many local businesses.

More ambitious learning activities include long-term field projects in cooperation with local agencies and non-profit organizations. As soon as we adopted Experience One in 2006, classes in environmental field studies began assessing stream restoration work by federal and state agencies in the upper Big Hole River drainage. In this continuing project, our goal is to assess habitat restoration designed to aid in the recovery of fluvial Arctic grayling, a declining fish species. Each fall, students spend up to 7 hours a day walking miles of stream under adverse conditions to gather data for a massive (over 300 pages) assessment report. The document includes recommendations for changes to the restoration plan which are commonly implemented by the agencies. A similar study has been ongoing for years in the Centennial Valley with The Nature Conservancy.[7]

Each student receives a copy of the report to include in their portfolio, which has landed more than one student a job or a slot in graduate school. Students present and defend their work at professional meetings and through our on-campus undergraduate research forum. The reports have made it onto the desks of politicians, the Director of the U.S. Fish and Wildlife Service, and most importantly into the hands of local landowners and citizens groups, who see with their own eyes the value of a Montana Western education.

How do we know it works?

The outcomes of Experience One on campus stability and student success are very impressive. Prior to Experience One (fiscal year 2000-01), the campus was at 990 full time equivalency (FTE) and its future was uncertain. After Experience One, student enrollment grew by a staggering 44.3% and now stands at over 1400 FTE.[8] It is important to note that during this time, we didn't add any other major attractions for students, so the growth is likely attributed to Experience One. When state funding models heavily factor in headcount, the importance of this enrollment growth for the Montana Western campus cannot be overstated.

What about student learning? Our student population is very similar to other open-enrollment public universities, including many working students, student athletes, and students who are "at risk." An impressive 56% of our incoming freshman class in 2012 required developmental coursework. With that

IN A WORLD WHERE BIGGER IS PERCEIVED TO BE BETTER, MONTANA WESTERN'S GREATEST WEAKNESS, ITS SMALL SIZE, TURNED OUT TO BE ITS GREATEST STRENGTH.

A COMMON CRITICISM OF EXPERIENCE ONE IS THAT STUDENTS ARE MISSING CONTENT AS A RESULT OF REDUCED LECTURE TIME. NO DATA SUPPORTS THAT CLAIM, AND, IN FACT, THE OPPOSITE HAS BEEN SHOWN TO BE THE CASE.

in mind, retention rates among first-time freshman from the fall of 2012 to the spring of 2013 reached an astonishing 88%, and degree completions increased 37% from fiscal years 2001 to 2013. Our cost of education is one of the lowest of the four-year campuses in the Montana University System, so we are more than meeting our cost-benefit obligations.[9]

A common criticism of Experience One is that students are missing content as a result of reduced lecture time. No data supports that claim, and, in fact, the opposite has been shown to be the case. In 2006, we conducted a campus-wide Cornell Critical Thinking Test that showed a marked increase in performance over an exam given prior to the adoption of Experience One. There has been no discernable negative impact on GRE or MCAT scores, and student success in graduate school remains positive.

Student satisfaction surveys show that our students are overwhelmingly positive about Experience One. In 2006, a Noel-Levitz Student Satisfaction Inventory (SSI) survey showed significant improvements over a pre-Experience One survey, with students particularly pleased with instructional effectiveness and student centeredness.[10] A National Survey of Student Engagement (NSSE) survey conducted in 2007-08 showed that student engagement in their education was significantly higher than other institutions in our Carnegie class and within the Montana University System. Most notable were high scores in three categories important to our educational model: 1) the level of academic challenge, 2) student-faculty interaction, and 3) active and collaborative learning. The NSSE survey was designed to query undergraduates about their educational experiences and to determine the degree of engagement in their education. The premise of NSSE is that student persistence and subsequent success in college is directly related to the level of challenge and time on task. They also contend that the degree to which students are engaged in their studies directly impacts the quality of student learning and the overall educational experience. As a result, NSSE contends, student engagement can serve as a proxy for educational quality. If true, the Montana Western survey data show that our educational quality is very high.[11]

Evaluation of Experience One by discipline also looks very promising. In my discipline, our job placement is well above the national average. A nationwide study of undergraduate geoscience placement by the American Geosciences Institute in 2013 showed that 40% of graduates with a baccalaureate degree were seeking employment, yet a mere 15% were employed in the discipline.[12] At Montana Western, 92% of graduates with a baccalaureate degree in the geosciences were employed within two years of graduation. Our students place well because they build portfolios filled with skills and experiences that are attractive to employers. They also make connections with employers through their service-based classes and internships.

Much of higher education is perception, so it's crucial how the outside world rates your educational quality. Since the adoption of Experience One, we have frankly been on an award train. As a campus, we have consistently placed very high in U.S. News and World Report Best Colleges rankings. Our latest ranking placed us as the third best public regional college in the west, and the second best campus in the nation for offering small class sizes on a budget. We have also been featured multiple times in high profile, educational magazines, including the *Chronicle of Higher Education*.[13]

Montana Western educators have scored big as well. We have received the last five Carnegie/CASE teaching awards in a row, including the Carnegie/CASE U.S. Professor of the Year Award in 2009, an honor never before bestowed upon a faculty member in Montana.[14] In 2013, two professors were acknowledged with the Mike Malone Montana Educators of the Year award, and we have the first and only Regents Professor outside of Missoula and Bozeman. A Montana Western professor, who shall forever remain unnamed, even "appeared" in *Playboy* magazine's Honor Roll list of the top 20 "most brilliant college professors" in America.15 Our staff, administration, and students have also been recognized with various awards for their contributions to the success of Experience One, attesting to the team effort that made our grand experiment possible.

Future of Experience One

The success of Experience One as an educational philosophy depends on it being more widely adopted. Any school of any size with limited resources can do it, but two basic

requirements must be met: 1) small class sizes and 2) teachers willing to commit to experiential learning. The most common response to this pitch is that it will not work at a large university. In fact, honors colleges have been providing the appropriate learning environment for Experience One at large universities for many years. Maybe universities should create honors colleges where high potential, but less well prepared students take their general education courses one at a time. Our data show that this approach dramatically increases continuation and persistence rates in this student population, so it should be attempted.

Another hybrid opportunity is to develop senior-year or senior-semester experiences within departments. Students benefit greatly from building portfolios filled with examples of what they can do with their knowledge. With a few willing faculty and some creative scheduling, senior-level classes can be offered in blocks, possibly with a thematic thread or project holding the classes together. Teacher education programs have been successfully doing this for decades with senior-level education blocks.

The real reason to consider Experience One is simply because it's more fun than lecturing. Southwest Montana is my lab. I walk the streams of the Big Hole and Centennial valleys each fall with my students, knowing we are making a tangible difference in this world. I sleep well at night knowing that political rants about the failings of higher education do not apply to me because my students are getting jobs as a result of experiences I provide. I turn down employment opportunities without regret because I can no longer buy into daily lecturing while my audience dwindles in size with each passing day of the semester.

Ultimately, Montana Western's grand experiment attests to the hard work and commitment of public employees. Many people have dedicated their careers to this endeavor and risked everything for the purpose of improving educational quality and saving a public institution. If I live long enough to afford retirement—and can still remember the journey—I know with certainty that I will recall this time with the courageous people who engaged in this struggle as our finest educational hour.

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DEVELOPING A CONVERSION PROCESS TECHNOLOGY TO PRODUCE THE NEXT GENERATION FUELS AND CHEMICALS FROM NATURAL OILS

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There is overwhelming consensus among climate scientists that the climate change we are now experiencing is very likely due to the emission of greenhouse gases mainly caused by human activities. Greenhouse gases like carbon dioxide, methane, and nitrogen oxides tend to accumulate in our atmosphere and cause global changes like unusual weather patterns and increasing average global temperatures. The leading source of greenhouse gases is the increasing use of fossil fuels. Although it is not feasible to stop using fossil fuel totally—as it is our major energy source to power our homes and transportation industry—it is very possible to find alternative ways to reduce its use.

In the transportation industry, one way of reducing the consumption of fossil fuels is to make their use more efficient. An example is the use of appropriately designed engines, such as a hybrid of internal-combustion and electric engine systems. Hybrid engine systems work well with light vehicles and buses. At low average speeds and the frequent stop-and-go operations common to city driving, hybrid engine systems are most efficient. However, for heavy trucks and aviation, these systems may work as inefficiently as internal combustion engines due to long periods of operation and the heavy loads associated with their use. In the aviation industry, it will take years to gather enough information on how hybrid engines work in extreme flight conditions. Moreover, regulatory agencies will not allow these types of engines in commercial planes unless they are certified as safe and dependable. Nobody wants to experience engine failure while travelling 30,000 feet above the ground. For this type of transportation, the use of alternative and biomass-based fuels is an option with significant potential. First and second generation biofuels such as biodiesel are proven and well-established. However, they have their share of deficiencies due to differences in chemical composition as compared to fossil-based fuels. Biodiesel, in particular, has different fuel performance properties than fossil-based jet fuels, making biodiesel incompatible with most aviation engines. While it is not impossible to develop and certify new aviation engines that can make use of first generation biofuels, it is impractical at the moment and will take decades to achieve a level of usefulness worthy of certification. The most convincing alternative is to develop a biofuel that has chemical composition similar to fossil-based fuels, i.e., containing only hydrocarbons. These types of biofuel are referred to as next generation or "drop-in" biofuels. Since most of the biomass sources—sugars, natural oils, and lignocellulosic materials—are made up of oxygenated compounds, the challenge is to develop a conversion technology that both removes oxygen molecules from the feedstock and produces suitable fuels.

There are several conversion pathways that have been studied to produce next generation biofuels, such as Alcohol to Jet (ATJ) by alcohol oligomerization, Pyrolysis to Jet (PTJ) by hydrotreating of pyrolysis oils, and Hydrotreated Depolymerized Cellulosic Jet (HDCJ) by catalytically depolymerizing cellulose to hydrocarbons. To date, only hydroprocessed esters and fatty acids jet fuel (HEFA-jet) produced from hydrotreating of natural oils such as jatropha, algae, and camelina oil has been certified by the American Society for Testing and Materials (ASTM) under the D7566 specification, "Aviation Turbine Fuel Containing Synthesized Hydrocarbons". The Synthetic Paraffinic Kerosene (SPK) through Fischer-Tropsch process has also been certified by ASTM but cannot be considered a biofuel as it is produced from syngas derived from coal and natural gas.

While HEFA-jet contains only hydrocarbons with carbon chain lengths comparable to conventional jet fuel, it is still not completely similar to fossil-based jet fuels. HEFA-jet lacks the aromatic content associated with fossil-based jet fuels. This lack of aromatic content affects properties such as fuel density (Moses, 2007; Rahmes et al, 2009). Material compat-

ibility with old gaskets and seal systems could be also an issue for biofuels with no aromatics (Moses, 2007). To mitigate some of the anticipated operational problems associated with the use of these bio-jet fuels, a maximum blend of 50% with conventional jet fuel is allowed. Moreover, HEFA-jet is produced under an energy-intensive process requiring relatively higher temperatures and greater pressures to achieve a reasonable conversion. Renewable diesel or green diesel which is produced from hydrotreating of natural oils contains hydrocarbons with longer carbon chain length (16 to 22 carbons) than HEFA-jet. Nestle Oil and Honeywell UOP are examples of refining companies that uses hydrotreating technology to produce renewable diesel. Like HEFA-jet, renewable diesel is produced under higher temperatures and pressures.

Montana State University Northern's Bio-Energy Center is engaged in developing and deploying novel conversion processes to produce next generation biofuels. One of the Center's current research projects, reported on here, is the conversion of camelina oil to advanced transportation fuels and chemicals. Unlike HEFA-jet and renewable diesel, the process under study uses green chemistry to minimize the production of unwanted by-products and avoid the use of high temperatures and pressure.

Aviation industry and biofuels

Road transportation fuel like gasoline and diesel is less critical in its fuel quality and performance properties than jet fuel. A diesel truck stalled in the road due to a clogged fuel filter is forgivable; jet fuel frozen in flight is not. This is the reason why a lot of time and effort is being expended in researching, developing, testing, and certifying next generation bio-jet fuels. For example, it took more than five years of testing and development before SPK and HEFA received certification from ASTM.

The development and certification of next generation bio-jet fuels is in line with a growing aviation industry. The industry has expanded significantly, both in global traffic and fuel usage, over the period 2000-2005 (Lee, et al, 2009). In the United States, despite the world-changing events in the early 2000s and the global financial crisis of 2007-2008, fuel usage in the aviation industry has shown a generally increasing trend (Figure 1). In 2011, the U.S. air industry consumed about a million barrels per day of petroleum (Davis et al, 2013). This is 3% of the total carbon emissions from all end-use sectors, excluding military operations. Carbon dioxide and nitrogen oxides (NOx) are the major greenhouse gas emissions from aircraft operations. Other emissions include water vapor, CO, hydrocarbons, SOx, sulfate particles, and soot. The utilization of domestic bio-jet fuel at 20% of the U.S. current consumption would reduce the country's petroleum usage by about 2.3 billion gallons annually. Government and private sectors have identified a unified research and development roadmap to assist in accelerating the development and deployment of bio-jet fuels. The U.S. Department of Agriculture, National Business Aviation Association, and U.S. Department of Transportation have teamed up to re-launch the "Farm to Fly" initiative with the primary objective of developing and advancing a comprehensive sustainable aviation biofuel rural development plan (National Business Aviation Association, 2013). With almost exactly the same goals, the European Commission, Airbus, and representatives from aviation and biofuels producing industries launched the "European Advanced Biofuels Flightpath" during the early quarter of 2011 (European Commission, 2014). This initiative targets the deployment of two million tons per year of renewable aviation fuels by 2020.

ROAD TRANSPORTATION FUEL LIKE GASOLINE AND DIESEL IS LESS CRITICAL IN ITS FUEL QUALITY AND PERFORMANCE PROPERTIES THAN JET FUEL. A DIESEL TRUCK STALLED IN THE ROAD DUE TO A CLOGGED FUEL FILTER IS FORGIVABLE; JET FUEL FROZEN IN FLIGHT IS NOT.

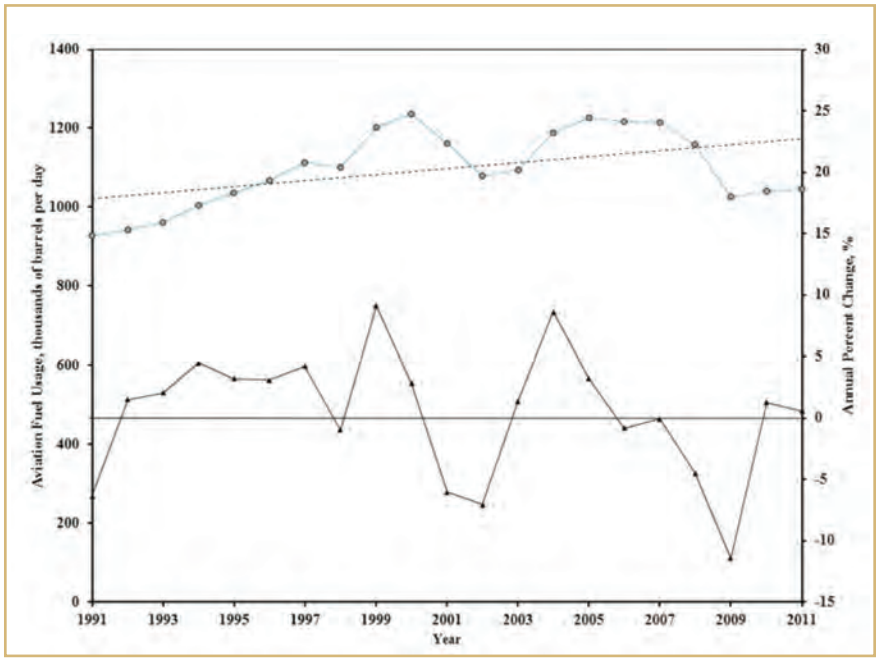

Figure 1. U.S. aviation annual fuel consumption from 1991 to 2011. [*Notes:* • aviation fuel usage ▲ annual percent change; *Source:* Davis et al, 2013.]

The technology

Back in 2011, Soriano et al. developed a low energy chemical process that converts camelina oil and other natural oils to hydrocarbons with carbon chain lengths similar to jet fuel. The process utilizes proprietary procedures and techniques to produce a biofuel that contains not only straight-chain hydrocarbons but also aromatic and cyclic hydrocarbons. Figure 2 illustrates the schematic flow diagram of the process. The first step involves a well-established alkene metathesis reaction—the rearrangement of alkene fragments at carbon-carbon double bonds using a metal-based catalyst (Grubbs, 2007; Vougioukalakis and Grubbs, 2009). This first step produces the necessary precursors (mostly in the form of alkenes) needed to produce paraffinic, aromatic, and cyclic hydrocarbons.

The next step is the proprietary aromatization, cyclization, and hydrogenation of the product following metathesis. Most transportation fuels contain mostly alkanes, also called saturated hydrocarbons. Though the hydrotreating process which produces HEFA-jet is able to make hydrocarbons, this high temperature process only produces paraffinic hydrocarbons. Rahmes and his co-workers (2009) reported that HEFA-jet fuels produced from camelina, jatropha, and algae do not contain any aromatics. The drawback of having no aromatics in the fuel is a density lower than the minimum limit of 0.775 kg/L at 15°C (ASTM D1655, 2013; Rahmes et al, 2009). Unlike HEFA, the aromatization and cyclization step in the process is able to produce both cyclic and aromatic hydrocarbons. Gas chromatography-mass spectrometry results confirm the presence of aromatics and cyclic compounds in the fuel fraction of the product. Depending on the operating conditions, up to 25% by weight of aromatics can be produced. Currently, the Bio-Energy Center is improving the process to produce bicyclic hydrocarbons as well. Bicyclic hydrocarbons could also increase the density of the fuel, as do aromatics. Thus, having bicyclic hydrocarbons and aromatics in the fuel may allow for higher blend levels of bio-jet and fossil-based fuels.

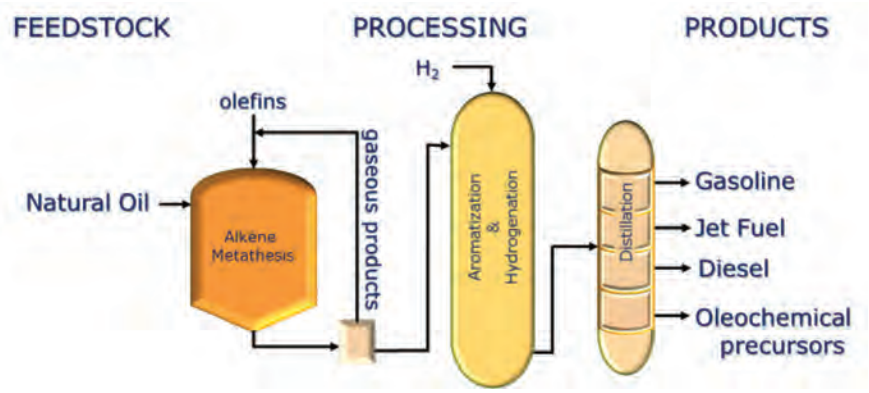

Figure 2. Schematic flow diagram of the process developed at MSU-Northern Bio-Energy Center.

Camelina as feedstock

While the process developed at the MSU Northern Bio-Energy Center is applicable to most types of natural oils, our research focuses on utilizing oil produced from Camelina sativa, an emerging high-value crop in Montana and Northern Great Plains. Camelina is relatively easy to grow and is considered a low input crop. It requires low seeding rate, is competitive in terms of weed control, and adapts well to dry and marginal lands (Ehrensing and Guy, 2008; Pilgeram, 2007). The ability of camelina to grow in situations not suitable for food production minimizes the food-versus-fuel concerns typically encountered in energy crop development. In addition, camelina's tolerance for the northern midwest's drought and spring freezing climate makes it an ideal oilseed crop for Montana. Field trial results in Havre showed an average yield of 1,666 lb/acre (McVay and Lamb, 2008). Camelina can also be used as a rotational crop for wheat. Fallow and rotation cropping systems are favored by dry-land framers since they contribute to restoring soil moisture and nutrients and breaking pest cycles.

Camelina-derived biofuel has been shown to reduce greenhouse gas emissions. In a recent Federal Register issued by the U.S. Environmen-

tal Protection Agency (EPA), biodiesel, renewable diesel, and jet fuel derived from camelina qualified as biomass-based diesel and advanced biofuels under the Renewable Fuels Standard 2 ruling (Regulation of Fuels and Fuel Additives, 2012). This suggests that EPA has estimated a 50% or more reduction in GHG emissions associated with transportation fuels derived from camelina. As an example, HEFA-jet derived from camelina reduces greenhouse gas emissions by 75% compared to conventional fossil based-jet fuel (Shonnard et al, 2010). With the unique characteristics and properties of camelina, it is the ideal feedstock in Montana for producing next generation biofuels.

Looking to the future

Like every technology developed in the laboratory, the production of jet fuel from camelina needs to be scaled up for commercial production. There is still much work to be done before this technology is used for large-scale purposes. There is still a lack of engineering data to take the process beyond the laboratory scale. The lack of an inexpensive, efficient, and robust heterogeneous metathesis catalyst needs to be addressed. This is why the Bio-Energy Center is working hard to produce this data and address the challenges at hand in order to succeed in the commercialization of the technology. Currently, the Center is developing a new heterogeneous catalyst for the process as well as optimizing the process for large-scale production. The Center is also in collaboration with private industry, including the world's largest aircraft manufacturer, toward achieving this goal.

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ACADEMIC MOTIVATION AND SELF-CONCEPT: THE KEYS TO POSITIVELY IMPACTING STUDENT RETENTION

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Higher education in Montana is experiencing a paradigm shift as the Board of Regents and Commissioner of Higher Education explore strategies to hold universities accountable for student retention—a difficult proposition in the face of ever-increasing industry competition from online, for-profit universities and increased global access via online technology to multiple university-based programs. One such strategy is to couple higher expectations for quality instruction and accountability with a funding scheme based on retention and/or graduation rates This performance-based funding model, along with a predicted decline in graduating high school students by 2038, will force Montana universities to implement student admission and retention strategies that focus on more than test scores and GPAs.

Struggles in American Higher Education

A *New York Times* article suggested that American higher education may be the best in the world, yet in terms of its core mission—turning teenagers into educated college graduates—the system is in large part failing (Leonhardt 2009). Academic failures have often been attributed to functions internal to the university such as inadequate orientation, lack of proactive retention strategies, and failed student transition as well as student adaptation capabilities. Isikail (2010), on the other hand, tied retention to student motivation, suggesting that students in the United States "begin university education with higher intrinsic motivation scores but their scores decrease in their second and third year of university education" (p. 582). Whether students abandon their higher education for external or internal reasons, why they persist in their pursuit of a college degree often involves variables outside the university's control.

Educators have a responsibility to engage students in challenging opportunities to spur continual personal growth. But how do educators foster individual motivation and positive self-concept in the hearts of today's college students? More importantly, is building student confidence really the job of today's college professor?

Absent a legal obligation, educators have a moral obligation consistent with Sergiovanni's model (2007) to teach the whole student—head, hands, and heart. This three-part approach is necessary if student success during and after college is the goal of today's educators. Therefore, an enhanced understanding of the factors with true impact on an individual's internal motivation and self-concept will assist educators' efforts in the development of proactive student strategies that positively enhance student motivation, self-concept, and ultimately academic achievement. What's more, evaluating academic achievement by coupling traditional college success criteria (e.g., GPA) with psychological variables such as academic motivation and self-concept will yield positive impacts on student achievement and college retention rates.

Our Research Questions

The recent research study focused on three main questions:

- What are the relationships, if any, between *reported academic self-concept and academic achievement* in freshman and senior business students at Montana Tech, the University of Montana Missoula, and the University of Idaho?
- What are the relationships, if any, between reported *intrinsic and extrinsic motivation and academic achievement* in these populations?
- What are the *most significant factors impacting the academic motivation, academic self-concept, and academic achievement* within these populations?

A quantitative, descriptive correlation design using a survey mode of inquiry was deployed. The study instrumentation included two primary survey tools: the Self-Description Questionnaire III (SDQ III), developed to measure academic self-concept in late adolescents to adults, and the Academic Motivation Scale (AMS), developed to assess various dimensions of motivation in college-level students. Surveys were distributed via on-site administration in a cross-section of Montana

Tech, University of Montana Missoula, and University of Idaho business courses. The goal of this cross-sectional design was to allow for triangulation of the collected data to identify themes and gain new perspectives relative to the subject area. By design, students used in this convenience sample were freshman and senior declared business students enrolled during the Spring 2012 semester on all three college campuses. Triangulation also provided validation of those factors with multiple impacts on a student's motivation and self-concept as they affect academic achievement. The total population of freshman and senior business students at the three institutions included 1,476 students. To achieve a 95% confidence level and a 5-point confidence interval, at least 306 of the 1,476 students were needed for a relevant and statistically significant study. The experimental consistency was defined at $\alpha = .05$ level. Experimental consistency and importance was estimated by conducting an analysis of variance using Levene's test for equality of variances, ideally to gain a significance value of $\alpha = / > .05$. An assumption of normality was met using the appropriate sample size. The study sample consisted of 364 second-semester freshman and senior business students at Montana Tech, the University of Montana Missoula, and the University of Idaho, gathered using a nonprobability sampling technique.

Our Revealing Findings

This study found that freshman students' self-concept is affected by their parental relationships but that this relationship has less impact on self-concept as a student matures. The reported outcomes also suggest that a higher self-concept is positively correlated with mathematical skill. Self-concept affects academic achievement and goal attainment. Positive correlations between self-concept and overall academic ability and mathematical skills were identified in all six student populations, suggesting that as overall academic ability and/or mathematical skills improve, student self-concept advances. A higher self-concept in turn impacts students' personal motivation and academic achievement. Student's self-concept relative to learning is affected by aptitude, prior experiences, and attitude. In turn, self-concept influences academic motivation, learning, and achievement outcomes.

The results of this study further suggest that self-concept is influenced by reinforcement from and evaluations by members of the same and opposite sex. When groups are combined, freshman students' self-concept is impacted more by same-sex and parental relationships, whereas senior students' self-concept is impacted more by opposite-sex relationships. Thus, peer relationships seemingly have more impact on freshman students' self-concept, and relationships with significant partners have more impact on seniors' self-concept—not a surprising finding in light of advancing maturity with age in both individuals and relationships. Younger students entering college may have a partner relationship, but relationships with peers play a vital role in advancing how they feel about themselves. As students mature, peer relationships play less of a role as the development of a quality relationship with a life partner becomes important. Hence, as students advance in their academic career, a long-term relationship and its future typically become more important than peer relationships.

All six student populations experienced increases in total motivation with the increase of intrinsic and extrinsic motivation. However, one notable correlation involved Montana Tech freshmen who experienced declines in GPA associated with increases in extrinsic motivation. This result suggests that external motivators such as salary have a negative effect on academic achievement in this freshman population. Globally, total motivation increased when intrinsic and extrinsic motivation increased.

THIS STUDY FOUND THAT FRESHMAN STUDENTS' SELF-CONCEPT IS AFFECTED BY THEIR PARENTAL RELATIONSHIPS BUT THAT THIS RELATIONSHIP HAS LESS IMPACT ON SELF-CONCEPT AS A STUDENT MATURES. THE REPORTED OUTCOMES ALSO SUGGEST THAT A HIGHER SELF-CONCEPT IS POSITIVELY CORRELATED WITH MATHEMATICAL SKILL.

Photo by Kelly Gorham.

THE RESULTS OF THIS STUDY SUGGEST THAT ALTHOUGH MOTIVATION DOES NOT INCREASE WITH AGE, IT UNDERGOES A DYNAMIC TRANSFORMATION AS STUDENTS MATURE.

Increased motivation in turn positively impacts a student's self-concept. Similarly, amotivation negatively impacts a student's total motivation, which in turn impacts student self-concept. Student's self-perception of internal competency is conducive to higher levels of intrinsic motivation.

The results of this study suggest that although motivation does not increase with age, it undergoes a dynamic transformation as students mature. As a group, freshman students are focused on their outer appearance and relationships with members of the same sex, suggesting that freshmen are more extrinsically motivated. Seniors, on the other hand, were more concerned about the quality of relationships and their internal belief in who they are as individuals. The strength of these internal beliefs was directly related to self-satisfaction, which suggests that senior students are more intrinsically motivated. The study results indicated that higher motivation leads to better academic achievement regardless of age.

Recommendations for Educators

Understanding what motivates a student to learn and how those motivators differ by generation is crucial to a student's academic achievement and future personal growth. Therefore, educators must consider modifying instructional techniques to accommodate evolving generational characteristics and personalities. Lectures must be adjusted to better develop students' critical-thinking and problem-solving capabilities. Although subject mastery is important, the ability to transfer classroom knowledge to the real world is more so. Students must advance from an extrinsic or performance goal orientation to an intrinsic, mastery-oriented one. To assist in the development of a student's self-concept, educators must first identify mastery- versus performance-based students, or intrinsically versus extrinsically motivated learning. It is vital to create educational learning strategies that complement and grow a student's positive self-concept, such as the implementation of in-class activities to assist students' understanding of themselves. Building self-regulated behavior skills and increased confidence levels in today's students is vital to academic success. Mastery goal orientation is associated with a heightened ability to overcome challenges and increase college persistence.

Institutions must move beyond offering extracurricular activities and student clubs to encourage student motivation and complement self-concept. Higher education institutions have traditionally worked off the premise that higher levels of involvement encourage college persistence. However, despite the increase in student groups and opportunities, retention rates remain low in Montana universities. Thus, we must move beyond student clubs and basic extracurricular activities to focus on strategies that promote higher-order thinking and transferable skills and knowledge working toward higher levels of motivation, confidence, and self-concept.

Recommendations for the Montana University System

Palmer (2010) suggests that higher education is at a critical juncture, requiring a creative education agenda to serve the human cause and emerging global economy. The time to adjust to this new student generation is now. What worked in the past will no longer be effective for today's students. Change is difficult and time-consuming, even more so for an industry like higher education that is departmentally structured and steeped in tradition.

A student's completion of motivational and self-concept tools such as the Self-Description Questionnaire III (SDQ III), and the Academic Motivation Scale (AMS), as required elements of the college application as well as, semester end evaluation criteria will only enhance student academic success. Moving beyond current GPA and ACT score criteria as a basis for predicting students' academic success will encourage individual appreciation of each student's current self-concept and motivation levels. In order to be successful, classroom and intercampus collaboration opportunities must be supported by institutional leadership. Educators must collect and correlate current demographic and personality data to construct student profiles complemented by motivation and self-concept measurement tools. Collection and analysis of common demographic data will provide a framework to better identify which student factors impact successful academic achievement. This activity, if consistently applied and supported by institutional leadership, will encourage institution-specific student strategies customized in accordance with student demographic data.

Research has demonstrated that partnerships between students, parents, and the institution improve overall student performance. While such partnerships are stressed at the K-12 level they are often abandoned at the onset of student's collegiate career. However, an evolved, ongoing parental relationship strategy may assist college freshmen as they make the transition to and through college. This may be the partnership needed to encourage some students to succeed beyond the infamous second college semester. Additionally, parents must reinforce the importance of college education by providing emotional support and consistent reinforcement of personal potential throughout a student's academic career.

Institutions of higher education could create student mentor programs similar to mentorships within organizations. A program of this kind would assign a junior or senior student to each new college freshman prior to the first day of class. During the crucial first year of collegiate study, each freshmen would be aligned with an experienced mentor; this recommendation is based on the relatedness premise of the self-determination theory.

From an academic perspective, student motivation is driven by the relationship between academic success and the internal priority the student places on the value of the educational cause. Variables such as positive self-concept, increased motivation, realistic self-appraisal, successful leadership experience, involvement, and individual differences are as useful as entrance standards as key evaluation instruments for predicting future GPA, persistence, and college graduation probability (Olani 2009). When controlling for traditional predictors, such as high school GPA and/or ACT/SAT scores, academic self-efficacy and achievement motivation were found to be better predictors of college success (Olani, 2009). Consequently, universities must respect student characteristics beyond GPA to strengthen retention efforts and reduce student separation.

Lessons Learned

Intrinsic and extrinsic motivation are not necessarily on opposite ends of a motivational spectrum; students are rarely either wholly intrinsically or wholly extrinsically motivated. As exhibited by this research study, the presence of both intrinsic and extrinsic motivation positively complement academic achievement and overall student self-concept. Ultimately, gaining a better understanding of today's students is key to empowering institutions as well as educators to shape learning strategies based on the whole student. The importance of greater student retention is exemplified on a state as well as local level. Student growth and retention efforts require a deeper appreciation and definition of today's student. Parents and educators can help by valuing what truly motivates a student to learn and succeed. This valuation requires soul searching by each student to better understand who they are and who they aspire to be. The path to inner growth is different for every student. Ultimately, educators and parents must encourage students to develop a mastery orientation fueled by intrinsic motivation. The vast student majority possess the required intelligence to successfully complete college. Thus, the missing piece to the college puzzle is student motivation, and motivation is impacted by an individual's self-concept. Students must possess an innate ability to regulate inner motivation. The ability to control motivation by improving self-concept promotes optimal performance in and outside of the classroom.

Fully engaging a student involves captivating the aspects of a student's heart and mind. Palmer suggested that today's mandate includes the creation of "universities to make or help to make human beings in the fullest sense of the words" (Palmer, 2010, p. 13). Education is more than learning theory—it is more about helping each student realize his or her own potential and, more importantly, how to become all they can be.

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TYLER TREVOR

Deputy Commissioner for Planning and Analysis, Office of the Commissioner of Higher Education, Helena, Montana

Montana Professor interviewed Deputy Commissioner Trevor about Montana's Performance Funding initiative.

Tyler Trevor

In view of the many complex and interrelated factors that are in play in students' success—including factors in the lives of the students themselves and the changing social and economic forces driving who applies to college and when—how is it that the performance of an institution is being singled out for analysis?

Instead of an institution being singled out, the entire Montana University System has been challenged to improve the educational attainment level of our citizenry in a major way. I think we should be proud of the confidence the state has expressed in us through that charge. Our faculty and staff in the MUS are amazing in their dedication and commitment to students. Still, in my experience, the public demand in Montana and the nation for accountability, productivity, and efficiency in higher education is at an all-time high. I believe every legislator who voted to increase funding for higher education did so with the expectation that we will boost Montana's educational attainment level in a significant way.

I know that our faculty and staff are familiar with measurements of student success and institutional accountability. The concept is not new. In fact, it is at the heart of our accreditation process that seeks to ensure institutions are striving to fulfill their missions. I could give many other examples aimed at communicating and improving student success at the institutional level, such as the Student-Right-to-Know Act in the early 1990s or individual campus strategic plans found throughout our system or even the new College Scorecard.

No one doubts that undergraduate retention and completion are important. We all want our students to stay in college if they can and ultimately graduate. But aren't there other, and some might argue more important, aspects of how good a job a university is doing: things like quality of the learning experience, opportunities for undergraduate research, engagement with the world? Granted, these things are notoriously difficult to measure, but isn't it unfair to make retention and completion the metrics that are being focused on?

I think it's important we remember why we are pursuing performance funding in the first place. Our nation and state have a goal of increasing the percentage of population that holds a higher education credential from 40% to 60%. That is an impossible goal if we don't strive to measure and increase completions. The relatively small piece of our total budget that is tied to performance funding or outcomes-based funding is simply an incentive for each institution to graduate more students and receive a reward for doing so.

It seems to me that retention and completion are good metrics for our performance funding model because they are basic indicators of student success. They can be measured quantitatively in a uniform fashion for all institutions within the system. I think we have faculty support for a manageable set of unambiguous metrics that are difficult to game, so to speak, and that reflect the priorities of our completion agenda. They also provide a good mix between progress and outcome, enabling campuses that may have a difficult time of increasing the number of completions in the short term to make progress by improving retention rates.

Recently, the Board of Regents approved a set of metrics to be used in 2016-17 and 2017-18 academic years. The metrics, which were developed by working groups of faculty and staff, include retention and completion for all campuses, but also include additional metrics that work to reinforce mission differentiation. For instance, at MSU and UM both graduate degree completions and research expenditures were adopted as mission specific metrics.

The faculty and staff who worked on this metric development noted some important points. As data gathering at the state and national level becomes more sophisticated and consistent, additional metrics that more fully connect outcome measurements to measures of quality may be considered. Those may include: measures of scholarly productivity that go beyond research dollars. They may also include measures of the integration of discovery, learning, and outreach activities that demonstrate value-added benefits of service to the community and to Montana. Or,

they may include post-graduate success as indicated by employment or subsequent graduate enrollment.

It's all well and good to say that we should all have an internal motivation to increase students' progress through college, but PF models suggest that universities are not trying hard enough, and if they don't try harder, it's going to cost them; this breeds insecurity and even fear. Is this a good approach to improving higher education?

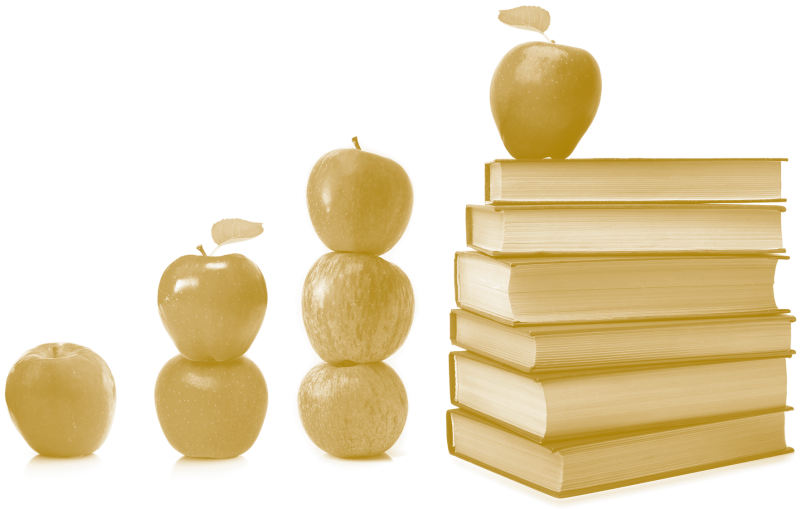
I firmly believe we are fortunate in Montana to have faculty and staff who go the extra mile to help students succeed. We will continue to involve faculty in decision making and we will keep sharing information about the purpose and progress of performance funding. I believe that kind of good communication will provide anyone who might feel emotions of insecurity or fear with the necessary data and context to grow more confident in performance funding. The Performance Funding Steering Committee is the primary work group tasked with providing recommendations to the Regents for outcomes-based funding. Members of that group have worked hard to communicate the directions and nuisances of this initiative, and they all recognize there is more work to be done.

Our short-term model allocates 5% of state funding for campuses in Fiscal Year 2015, about $7.5 million, toward performance outcomes. I think it's important to remember that the emphasis is on continuous improvement rather than hitting specific targets or benchmarks. Also, campuses are measured against their own prior performance, rather than comparisons to other campuses. I think progress is important and a reasonable goal. For the completions metric, all campuses in the MUS made improvement over the previous years and received additional funding. In the retention metric, two-thirds of the campuses made progress. For campuses that did not make progress, a "stop-loss zone" was employed, whereby campus allocations were incrementally decreased in relation to the amount of decline within a given metric.

A common concern that is raised about PF is that it is inevitable that faculty and deans will feel pressure to cut corners and lower standards in order to help meet PF expectations. Lower D and F rates in courses will certainly help more students toward completion, and that is simply one of the things that will need to happen in order for a university to have the best shot at PF based funding. Doesn't essentially requiring faculty members, departments, and deans to do more to help students be successful in their courses and programs just to meet PF metrics seem unrealistic?

I think we need to emphasize that we have always had a certain kind of performance funding. All of the funding in the past has hinged on enrollment without regard to student success. If the campus could show there's a student there, the money followed, no questions asked. Faculty members are the first and last producers and preservers of educational quality. Under the old way of doing things, it could be argued that institutions could

IT SEEMS TO ME THAT RETENTION AND COMPLETION ARE GOOD METRICS FOR OUR PERFORMANCE FUNDING MODEL BECAUSE THEY ARE BASIC INDICATORS OF STUDENT SUCCESS. THEY CAN BE MEASURED QUANTITATIVELY IN A UNIFORM FASHION FOR ALL INSTITUTIONS WITHIN THE SYSTEM.



MAINTAINING HIGH-QUALITY INSTITUTIONS AND EDUCATIONAL EXCELLENCE IS THE MOST IMPORTANT CONSIDERATION OF ANY INITIATIVE IN THE MUS.

try to keep students on campus longer than necessary, protracting the time to degree, in order to receive and maintain funding. I don't buy that argument because I know the credibility and integrity of our faculty and our institutions is tremendously strong. Similarly, with a performance tie to funding, it could be argued that faculty will now try to ramrod students through college with less academic rigor and quality. I don't buy that argument, either, because our faculty have demonstrated commitment to quality and high standards time and time again.

Maintaining high-quality institutions and educational excellence is the most important consideration of any initiative in the MUS. The topic of quality has permeated almost every discussion on performance funding I've been involved in, and it is a topic the Regents and Commissioner take very seriously. Fundamentally, we don't believe that faculty, who are the keepers and guardians of academic standards, will allow quality to diminish due to performance funding.

It is well-known that PF has been abandoned in some states. Many share the perspective that it is a fundamentally flawed system. Why has Montana adopted it?

As I mentioned earlier, the MUS has tied funding to performance for more than 30 years, with the sole metric being enrollment. Now, rather than allocating 100% of our state funding based on input or enrollments, we've committed a relatively small proportion of 5% of our budget to a few measures of progress and outcome. Already we've seen an increased interest and dialog around the topics of retention and completion, complementing our long-term commitment to access in our funding model with a small focus on success. In short, we've improved our state appropriation allocation methodology by doing a better job of paying for what we value.

I've talked about the national and state goals of increasing the educational attainment level of our citizenry. Additionally, an important catalyst that led to the MUS committing to performance funding in the 2013 Legislative Session was the College Affordability Plan – the "CAP." The CAP is an agreement between the MUS and the Governor to implement a resident-student tuition freeze for the 2013-14 and 2014-15 academic years if certain funding levels were provided for by the Montana Legislature. In order to obtain the funding levels, legislators indicated that we needed to do more than just show up with our hands out. We needed to use some of the new funding to drive outcomes. The MUS committed to performance funding, and as a result, received one of our largest-ever biennial increases in state appropriations. It is a $50-million increase over the previous biennium.

True, some of the first generation performance funding models from the 1990s and early 2000s have been abandoned or significantly modified. Some of the states that have abandoned their old models have adopted new models that typically contain a relatively small number of outcome-based metrics that are easy to understand and measure, and are often linked to the public agenda for increased completions. Today there are 26 states working toward some form of outcomes-based funding. The metrics are limited in number and reflect mission differences between institutions. Funding is often embedded within the base rather than reliant on additional funding. Some states have discovered a serendipitous element to the effort of linking funding to performance goals. Those states discovered that the underlying dialog and collaboration that is necessary to make the link has generated new interest and support among state leaders outside higher education.

BRIC: MONTANA TECH IS BRINGING RESEARCH INTO THE CLASSROOM

Too often in education, the joy of scientific discovery is a carefully guarded secret. Yesterday's amazing discoveries, today's ideas, and tomorrow's questions are deeply buried under mundane presentation, forced memorization, or rote regurgitation for standardized tests. Curious children—potential scientists—turn to other creative endeavors, or, worse, lose their spark to learn about their world. A tiny biological organism has the power to change this. Bacteriophages, tiny viruses that infect bacteria, can be isolated from environmental soil and water samples using introductory microbiological techniques that are tractable to high school, middle school, and even grade school students.

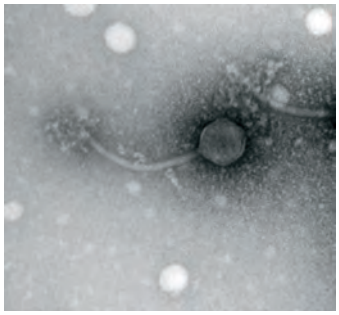
In 2005, Dr. Marisa Pedulla joined Montana Tech's Biology Department as Assistant Professor. For nine years, the 1996 Olympian has shared her passion for microbiology and science education with students and teachers across Montana. In addition to teaching 31 different (mostly newly developed and offered) classes, Dr. Pedulla has mentored research projects for over 30 undergraduate and 8 graduate students in her laboratory. Beyond campus borders, Dr. Pedulla has taken discovery science to dozens of precollege teachers and over 3,500 precollege students in the "Phagedigging" Outreach program. The success of this project and its potential to transform science education was recently recognized by the National Institutes of Health (NIH).

In April 2014, the NIH Science Education Partnership Award (SEPA) announced a grant of $1.25 Million to Montana Tech for a science education research project titled, "Bringing Research into the Classroom (BRIC): A Partnership for Research and Education In the Montana Public Schools." Dr. Pedulla and Rayelynn Connole, director of Cfwep.Org, are co-leading this effort. The BRIC project combines intensive professional development for teachers with in-class bacteriophage discovery, mentored by university faculty and undergraduate students. The project goal is to equip Montana's K-12 teachers with the knowledge, skills, and dispositions to provide high-quality health science research opportunities for students.

Montana Tech Biology Faculty and Cfwep.Org Education Experts will mentor pre-college students and teachers as well as undergraduate and graduate students in a coordinated research effort to discover and characterize bacteriophages. The number of bacteriophages on earth is astounding; with n=1031, they outnumber all other living organisms combined. Their vast numbers and great genomic diversity mean that no identical phages have ever been independently isolated. Anyone who is provided simple instruction and a few inexpensive supplies can discover a virus previously unknown to science. Beyond simple discovery, the biological, genetic, biochemical, molecular, and bioinformatic characterization provide ample material for scientists of every level, including Nobel laureates. For example, classic experiments with phages demonstrated that DNA is the genetic material, and their gene products provided the tools that allow DNA cloning, the foundation of molecular biology.

By equipping teachers to facilitate bacteriophage discovery within their classrooms, the BRIC project aims to build a cadre of teacher leaders in Montana. These teachers will engage their students in rigorous and relevant research experiences and mentor other teachers to do the same. BRIC and the teachers involved will enable Montana students to personally experience the excitement of scientific discovery. Montana Tech undergraduate students, as near-peer mentors, will serve as role models to

Bacteriophage "BoryCriar" was isolated in the BRIC Phagedigging Program. Photo courtesy of Dr. Jim Driver, University of Montana EMtrix.



High School Students Engaged in Microbiology.

provide students a glimpse of what is possible.

BRIC-funded classroom visits began in May, 2014, with recruitment of teachers ramping up in the fall. Four years of two-week summer teacher research workshops will begin summer 2015, with a capstone workshop in summer 2019.

Anaconda High School teacher Kate Mattern, 2012 Montana NABT Biology Teacher of the Year, noted with enthusiasm, "Through this grant, our students will gain an appreciation for research and scientific partnerships that fosters a love of science and an understanding of its process and importance."

Montana Tech Chancellor Don Blackketter added, "The BRIC project exemplifies Montana Tech's commitment to outstanding STEM educational experiences for K-20 students. The award also recognizes Tech's high-quality faculty and staff and their commitment to science education."

Submitted by the program directors.

PARTNERING FOR STUDENT SUCESS IN THE SCHOOLROOM

Partnerships are the key to maximizing Montana's limited educational resources. In Spring 2013, Dr. Tessie Rose Bailey from the Education faculty at Montana State University Billings (MSUB) partnered with an elementary school principal and a newly-hired program specialist to identify solutions to declining 3rd grade math and reading scores and a growing population of students with challenging behaviors. Through this partnership, it became clear that Montana's largest school district needed a more comprehensive approach to early intervention. By Summer 2013, Dr. Bailey and a Billings Public Schools (BPS) team embarked on a three-year partnership to develop and implement a multi-tiered system of support (MTSS) model in the district's 22 elementary schools.

MTSS is a schoolwide prevention framework shown to increase academic outcomes, reduce behavior problems, and improve services for students with disabilities (Burns, Appleton, & Stehouwer, 2005). At the heart of the framework, schools 1) use screenings to identify at-risk students, 2) provide a tiered system of increasingly intense interventions and supports, 3) conduct progress monitoring to assess students' response to those supports and interventions, and 4) engage in collaborative teaming to make data-informed decisions about student learning (NCRTI, 2010). Until recently, the Office of Public Instruction (OPI) supported implementation of two distinct tiered models: 1) an academic model, referred to as response to intervention (RTI; OPI, 2014a) and 2) a behavior model, known as the Montana Behavioral Initiative (MBI; OPI, 2014b). Efforts to align these models under a single MTSS system have been hampered by perceived competing priorities (e.g., common core, RTI/MBI grant projects) and incompatibility of the current models. The BPS MTSS model is being developed using an ongoing improvement strategy to ensure it meets the unique needs of BPS students.

Although the partnership is still in its infancy, all nine schools in Cohort 1 demonstrated measureable growth in reading outcomes for K-2 students and increased teacher knowledge and skills. Dr. Bailey, in an effort to build capacity, collaborated with district staff to conduct four all-day team level MTSS trainings and provide on-site coaching and technical assistance. In addition, she met quarterly with the MTSS district team to address implementation concerns, develop technical assistance resources, and monitor the effectiveness of the model. Over the next two years, the remaining 11 elementary schools are scheduled to participate in the MTSS project while Cohort 1 will receive ongoing support to refine their implementation.

Effective partnerships must be mutually beneficial…and this partnership is no exception. While BPS is increasing its capacity to address a critical need, MSUB pre-service

teachers are benefiting from increased opportunities for authentic field experience. During the first year, undergraduate students participating in assessment courses conducted screening alongside veteran teachers. Not only did students gain practical skills and experiences, they helped fill a resource gap identified through the BPS partnership. Several graduate assistants, seeking leadership opportunities and practical experience, conducted school level trainings for veteran teachers and MSUB students on how to administer MTSS assessments and analyze initial data. As an additional benefit, training opportunities provided through the project were available for free to MSUB students and MSUB College of Education faculty were provided access to authentic data for class assignments.

In the long run, this partnership is expected to provide additional field placement opportunities for MSUB pre-service students. Following a successful first year, four additional MSUB faculty members joined the partnership and are currently seeking external funding to expand the project.

Submitted by the program directors.

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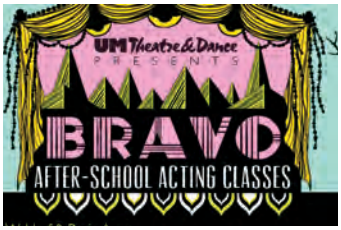
BRAVO! FOR OUTREACH IN ACTING AND LIFE SKILLS



Now in its second year, BRAVO! is directed by Teresa Waldorf, the Educational Outreach Coordinator for the Montana Repertory Theatre and UM School of Theatre & Dance Adjunct Professor of Drama in Elementary Education courses. BRAVO! was the brain-child of Professor Jere Hodgin, Acting and Directing instructor at the school, who, with Teresa's help, launched BRAVO! in the fall of 2013 to expand the UM School of Theatre & Dance's educational outreach into the Missoula community and outlying areas.

At its most basic level, BRAVO's curriculum approaches "Acting Lessons" as a life skill for students. "Whereas a small number of these kids may go on to become performers or actors, the majority of them will not, but they will all be expected to interview for a job or speak in front a group at some time in their future. We can help them do that well, with confidence and style," explains Waldorf. Enrolled students engage in creative dramatics, improvisation, beginning-level acting, story dramatization, musical theatre, movement, short scene work, and more. The intent is to develop self confidence, imagination, and independent thinking while cooperating, to build social awareness, and to help children gain better habits of speech all while taking a walk in someone else's shoes.

With this in mind, Teresa Waldorf and her team-teacher Rosie Ayers spent two twelve week sessions last school year playing with, teaching, directing, and modeling behavior for their 50+ "first year" students, Monday through Thursday from 4:00-5:00 pm in a bright and welcoming acting studio in UM's McGill Hall.

Each semester culminated in a showcase performance in the Masquer Theatre in the UM Performing Arts Building, allowing students to show off their new skills while family and friends got to sit and watch…and share in the fun.

The Fall Showcase brought the audience of more than two hundred people a story dramatization of Tacky the Penguin by Helen Lester by the K-1st grade class, a scene about the importance of choosing to be seen, heard, and understood by the 2nd-3rd grade class, a dramatization of student-written verse inspired by the poem "If I Were In Charge Of The World" by the 4th-5th grade class, and a funny short play written by the 6th-9th grade class called "Ghost Cats." The finale was a comic reading of *The Schmo Must Go On* by Richard Thaler including all fifty student actors.

In the spring, Rosie spent her time with the 6th-9th grade class working on Theatre for Social Change in which actors made themselves into a Living Art Gallery centered around the theme of social injustice for the preshow part of the Showcase.

Mr. Tiger Goes Wild by Peter Brown was the inspiration for an animal study scene by the K-1st grade class. And the 2nd-3rd and 4th-5th graders all performed Reader's Theatre selections chosen by the class from the many scripts they read over the course of the semester.

Whereas the semesters culminate in showcase performances, the daily classes remain process-driven, with much more time being spent on building confidence, learning to think on one's feet, improvising, and just having fun. The TION TEAM (CooperaTION, ImaginaTION, ObservaTION, ConcentraTION) is a big staple when choosing warm-up activities for each class, and students are constantly encouraged to come up with their own material for scenes, monologues, and dramatizations.

Submitted by the program directors.

PERFORMANCE BASED FUNDING, continued from page 7

characteristics (such as population, resident income levels, levels of wealth & poverty, and population growth) were more likely to explain changes in the outcomes than were variables associated with state governance of higher education (such as centralized control over higher education institutions; performance based budgeting; level of institutional autonomy). In examining the outcome of completions (graduation rates), the only variables that predicted a positive change in graduation rate over time were those that increased accessibility of higher education, such as increased numbers of high school graduates, lowered tuition rates, decreased numbers of high school students leaving the state, and the proportion of enrollments in private higher education. Over time, rising tuition costs are associated with lowered graduation rates across a 12 year period, but state control of higher education (such as performance based funding) did not improve completion rates across states.

ONE OUTCOME WAS THE GENERAL AGREEMENT ON THE PRINCIPLE THAT MOVEMENT TOWARDS ANY SPECIFIC PERFORMANCE BASED FUNDING PLAN TAKE INTO ACCOUNT PEER REVIEWED ASSESSMENTS SUCH AS WE HAD PRESENTED—AND NOT SIMPLY RELY ON THE BOOSTERISM OF INDIVIDUAL CONSTITUENCIES, SOME OF WHOM WERE PAID TO ADVOCATE FOR IT.

This memo was shared and discussed with the Board of Regents at their next meeting in Missoula. One outcome was the general agreement on the principle that movement towards any specific performance based funding plan take into account peer reviewed assessments such as we had presented—and not simply rely on the boosterism of individual constituencies, some of whom were paid to advocate for it. Subsequent to our discussion of this memo, additional research and experiments in other states have continued. Other researchers since then have continued to examine PBF trends and results. Michael McLendon and James Hearn do just that in a recent AAUP article, "The Resurgent Interest in Performance-Based Funding for Higher Education," also helping clarify some of the terms employed. They distinguish three flavors of Performance schemes that have evolved over fifty years—and that also informed our Faculty Senate memo included above: 1) *Performance Based Reporting*, the least directive of the mechanisms, where institutions simply report campus performance on key indicators to the Board and the public, with the view that good data and transparency will drive good decision making. 2) Next in line is *Performance Based Budgeting*, where Boards consider campus performance on a set of indicators in making budget allocations, but retain flexibility in taking into account all available information. 3) Most directive is *Performance Based Funding*, where state funding is linked directly, according to specific formulas, to campus performance on selected indicators. Matching the results of our own literature review, McLendon and Hearn report that experiments with these approaches increased dramatically in the 1970's, then fell away at the turn of the millennium after initial results, especially with PBF versions, were mixed. But then various factors in recent years, including a reorganized lobbying campaign from political interests, have helped resuscitate PBF from "the near dead," to where it is now resurgent again in most states.

As is often pointed out, Tennessee was the first state to formalize a PBF mechanism, in 1979-80. Connecticut was next, in 1985, with Missouri following in 1991 and Kentucky in 1992, with 21 states employing some version by 2001. Since 2001 it has remained a dynamic playing field, with various comings and goings, and public political fights, so that as of February 2013, as McLendon and Hearn point out, "the National Conference of State Legislatures counted twelve states with active systems, four in the process of implementing new systems, and nineteen discussing implementation of a new system." South Carolina's approach is often cited as an example of failure, initially attempting to base 100% of appropriations on PBF formulas, which turned out to be more complicated and costly to implement than planners first anticipated, so they dismantled the scheme. Ohio, on the other hand, is currently in the midst of an experiment that is scheduled over time to lead to 100% of appropriations being based chiefly on "course and degree completions."

It may be useful to remember just how funding mechanisms for university systems in general have worked in the past. The long-standing system in place generally for public universities for most states has used some

THUS, PBF SCHEMES WERE OFTEN MARKETED WITH ACCOMPANYING RHETORIC THAT PERFORMANCE MEASURES AND ALLOCATIONS OF ANY TYPE HAD BEEN MISSING IN THE PAST, AND THESE NEW SCHEMES WOULD FINALLY RESTORE HERETOFORE MARKET REWARD FORCES TO THE UNIVERSITY LANDSCAPE WHERE THEY HAD BEEN MISSING COMPLETELY—WHICH SIMPLY WASN'T TRUE.

version of funding the public component of higher education (the tax dollar portion, as opposed to tuition) by counting students in the system (ubiquitously and somewhat derogatorily referred to by PBF promoters as the *butts in seats* method). Thus, at a designated calendar day (the 15th day in the MUS), our institutions would report the total number of students at the institution, using a mathematical Full Time Equivalent (FTE), and be reimbursed accordingly (an amount which in the case of MSU, for example, now accounts for 30% of the cost). The value of this longstanding method lay in its simplicity: when student populations were stable and state funding was stable, university budgets were predictable and planning became easier; moreover, institutions became adept at tracking and predicting enrollments, contributing to financial and program planning. Furthermore, the method incentivized growth (educating more students) and competition for students (itself an incentive for quality), as long as the combination of state funding and tuition together exceeded the cost of educating the student; and the competition for students also incentivized continuing to improve infrastructure, including student amenities (the so called "climbing wall phenomena"—Auburn University just spent $67 million on its new student exercise facility) as well as quality and variety of programs. Institutions, then, created budgets through shared governance planning processes with input from various levels (Administration and Budget Committees) to best serve the various, complex goals of the institution. The innovation of PBF was to single out specific aspects of institutions' missions and tie some percentage of funding directly to moving those needles in the right direction. Innovation is perhaps too strong a word: whether in the business world or even the public sector, creating systems of rewards for meeting institutional goals is as old as capitalism itself; think bonuses for meeting sales goals. What was new for higher education was the trend from Performance Based Reporting or Budgeting to Performance Based Funding, that is, the tying of institutional funding *from the top* to specific targets.

With this history, nationally and locally in mind, whether one supports PBF or not, a few thoughts on the terminology used in this debate might be in order, and at the start, it should be recognized at the outset that the name, *Performance Based Funding*, itself is not neutral. It has been strategically named by promoters. A more neutral, and accurate, name for most states' experiments, at least those shy of 100%, would be *Target Based Partial Funding Incentives* (TBPFI—not exactly a catchy acronym, though).

Early on in the rise of PBF experiments nationally, the targets focused on were retention rates and graduation rates. The idea was to improve those by increasing specific incentives for doing so. This is where the strategic naming of PBF comes into play. It wasn't as if there weren't already direct, powerful incentives for increasing retention and enrollment. There were—in tuition and state FTE funding. Neither was it that there weren't, albeit somewhat less direct, incentives for graduating students (via a competition for institutional reputation for quality results). Finally, it wasn't as if there weren't already performance evaluations and rewards *throughout* the system: faculty throughout the MUS are reviewed annually, with merit pay tied to performance in all aspects of their job: teaching, research, and service. But what PBF dictated was a more interventionist focus (sometimes also called "accountability efforts"—a name also not "neutral"), from the top, on specific, identified targets, hoping to tip the scale of individual campuses' planning processes in the directions desired through funding mechanisms instead of traditional policy directives from Boards, as had been the case in the past. And it allowed for good public relations: communicating to the public that the governing boards were doing something. Thus, PBF schemes were often marketed with accompanying rhetoric that performance measures and allocations of any type had been missing in the past, and these new schemes would finally restore heretofore market reward forces to the university landscape where they had been missing completely—which simply wasn't true.

Additionally, it is useful to note that the rhetoric employed by proponents of PBF, especially in its resurgence since 2000, borrow heavily from the business and corporation worlds: what we should be paying for, it is argued, are *outputs* not *inputs*. We should be funding *success*, not *attempts* (meaning numbers of degrees, not butts in seats).

Promoters borrow from the commercial world that produces products (degree production!), as opposed to offering services (education, basic research, agricultural extension). Deploying free market economically flavored arguments, proponents argue (and I heard one consultant actually say this to the Board of Regents at a meeting) that traditional FTE funding models only incentivize the continual recruitment of students and endless growing of the student populations and never actually graduating them—that based on current incentives, it was in universities' interests to never let any of them out of the place! (The irony of this argument is that while graduation rates are a real concern, public universities have always sustained respectable graduation rates, though with room for improvement; it's actually the new market driven for-profit university sector that has been recruiting, receiving funding, and *not* graduating students, punctuated by the recent spectacular bankruptcy of Corinthian Colleges.)

PBF schemes and the rhetoric that promotes them focus on few aspects of higher education performance, and are thus, by design, intentionally *reductive*. Those focusing on graduation rates alone tend to reduce the complex social function of universities as multi modal entities (to use the familiar three-legged-stool terminology of the mission of most of our universities) responsible for *teaching*, *research*, and *outreach*), to just one: teaching. And they tend to reduce teaching to degree production, even though, as Derek Bok has explained in his recent book (*Higher Education in America*, reviewed by the *Montana Professor* in issue 24:1), that the great success of the American university system over its entire history has been its tripartite mission: 1) equipping students for careers by providing skills and training; 2) preparing students to become enlightened citizens of our democracy; and 3) preparing students to live full, satisfying lives capable of reflection and self knowledge. Bok warns that government officials, policymakers and reformers do a disservice when they only speak of the first—as they too often do—and only in the context of increasing our global competitiveness. Part of what has made the American system the envy of the world is embedded in its multiple goals and its determination to make progress on all three goals available to as wide a swath of the population as has ever been attempted. Our own regents, though they obviously all know better, sometimes speak about our university system and all its entities (from our two years to our research universities) as if its sole purpose was job training and workforce development.

The rhetoric used by supporters of PBF also tends to obscure the fact that institutions aren't fully in control of student success. The various factors in student success and graduation rates have been well studied and documented, including adequate academic preparation in the first place, and of course, individual hard work. Another chief factor affecting success is access to financial aid (many states have their own state financial aid funding working in coordination with federal monies; Montana has very little state support for scholarships.). PBF mechanisms have no impact on these extra-institutional factors. There are factors that institutions can and are trying to control—such as improving advising, improving tracking and intervention systems, improved teaching methods, and tutoring. And then there is the gorilla in the room that everyone interested in the future of higher education should care about, and which faculty, at the front lines of the delivery of that education, care about deeply: the issue of quality. It is difficult to get around the fact that PBF regimens that focus on degree production necessarily focus on quantity not quality. But as we all know, both "q's" matter: in fact, keeping both high should be the highest goal of all stakeholders—and it is interesting to remember that an earlier set of similar experiments in the MUS with performance measures *did* include the "q!" In the 1990's, the experiment was known as PQ&O: or in other words, Productivity, *Quality*, and Outcomes.).

Given all this, it is interesting to ask of Montana's place in the national PBF debate: why now? Where do we fit in? McLendon and Hearn, in an empirical study, actually identify some interesting patterns across states where PBF programs have been resurgent—patterns which it would behoove Montana to attend to. First, they find that states with the most stable PBF systems are those with the highest involvement of state higher education officials, as opposed to the voices of "legislators, governors, businesspeople, and community leaders." That

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is, PBF designs are working best where experts in the fields are working on the details instead of politicians running for office. Insulating higher education somewhat from the vicissitudes of two year election cycles is one reason many states have governing boards in the first place. Second, as should be no surprise, McLendon and Hearn find that partisan politics is a driver of states towards PBF. Third, they find that states with more powerful or centralized Boards have been "less likely to adopt performance-funding policies." I invite readers to decide for themselves just where Montana fits into these trends.

So, where are we now? Since 2010, our MUS has been progressing along the path of developing PBF plans. As the BOR webpage states, "The Montana University System is engaged in the process of exploring and developing performance funding models to be included as an additional component in the allocation methodology for distributing state appropriations to the MUS campuses. The process has been split into two phases, 1) a short-term pilot phase directed at the allocation of funds specifically for FY 2015, and 2) a second phase aimed at developing a performance funding model to be used on a longer-term basis. This second phase will occur during the 2013-14 academic year, whereby the MUS will engage faculty and staff throughout the system in an effort to fully develop a performance funding model. A Performance Funding Steering Committee has been appointed to provide oversight and direction of this process." (More details can be seen by going to the BOR webpage: http://mus.edu/CCM/performancefunding/PerformanceFundingSteeringCommittee.asp

Those processes are still underway. Faculty are participating in various ways. Montana State University held charrettes last year to get input on details. Phase two was scheduled for a BOR vote at the May 2014 meeting. Further votes will follow. The details of these plans matter a great deal. Partly because of the trends already identified, the plans extend far beyond the parameters suggested above in our 2010 Faculty Senate memo above. Whether these plans turn out to be beneficial to the university system to which many of us have devoted a great part of our life's work remains to be seen. It is hoped that the details are rigorously debated, closely examined, and that the plans and decisions are data driven. Our students should expect nothing less.

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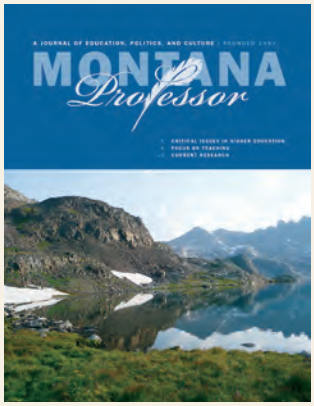

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Funding from the University of Montana and Montana State University covers the production, printing and distribution of the journal.

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