

Notes from Engineering and Technology Discipline Workgroup Meeting #1 August 1, 2007

Hillary Fuhrman welcomed everyone and introduced Missouri Department of Higher Education (MDHE) staff present. Participants introduced themselves. Ms. Fuhrman proceeded with her PowerPoint presentation and presented the goals for the meeting following the slide entitled "Today's Goals."

Today's Goals

Particular attention was paid to:

- 1) The context of the current discussion on curriculum alignment.
- 2) The urgent need for this work to be done:
 - a. Need to address the tremendous gap between K-12 and higher education
 - b. 35% - 40% of postsecondary students in Missouri need remedial work
 - c. Curriculum alignment is an integral part of any strategy to increase student success in postsecondary education.
- 3) The overall vision for these meetings is for faculty to communicate how to reduce this percentage.
- 4) The importance of collective decision-making for this process

It was emphasized that this was an opportunity for faculty to influence state policy on curriculum alignment and expectations. The MDHE staff was simply there as facilitators to help the group focus and define their next steps. One of the necessary outcomes for this meeting was the selection of two representatives to serve on a Steering Committee.

National Curriculum Alignment

"Curriculum Alignment" is a "nebulous phrase" that is played out across two areas:

- 1) Secondary to Postsecondary Alignment
- 2) Postsecondary Course Alignment

Resources were passed around for those present to look at and discuss later. (See Resources Handout)

"Secondary to Postsecondary Alignment" is of particular concern as the expectations between secondary and postsecondary educators are so vastly different. Secondary curricula do not necessarily lead to postsecondary success, even though 90% of students profess interest in continuing on to postsecondary education. The American Diploma Project was mentioned. Those present agreed that it would be wonderful if Missouri became an American Diploma state, as this would better prepare students for postsecondary education.

Assessment was described as being a sort of gatekeeper between secondary and postsecondary education. MODEC and information regarding placement tests were discussed relevant resources. The wide range of scores that were acceptable by various

postsecondary institutions made preparation for these tests problematic. Students do not currently have a clear message as to what they need to do to prepare for college.

The discussion was turned towards concerns with “Postsecondary Course Alignment”. Paramount concerns were:

- 1) Differences between course numberings and standards
- 2) Differences between institutional missions, goals, and related standards

Resources aimed at correcting these differences were passed around. These included examples of state initiatives from Colorado and Illinois as well as The American Math Association of Two Year Colleges (AMATYC). Some of the better state-level alignment work involves course competencies, outcomes, and contents. Much of this work has been mandated by state law. In Missouri, the Department of Economic Development has been working hand-in-hand with the Department of Elementary and Secondary Education (DESE) and MDHE to maximize the value of student learning to insure the future of the state’s economy. It was mentioned that the State Board of Education revised graduation requirements last year, and the Coordinating Board subsequently revised its Recommended High School Core Curriculum

National Context/Drivers

On a national level, much of curriculum alignment has been driven by No Child Left Behind (NCLB) and the Spellings Report “A Test of Leadership: Charting the Future of U.S. Higher Education.” Concern was raised that NCLB does not emphasize enough the skills that a student needs to have to be prepared for life after high school.

Concerns were raised regarding the assessment of dual-credit programs. Those present were reminded that the work they did in curriculum alignment would influence these discussions as well, because state policy already set forth that dual credit and traditional collegiate coursework should be equivalent. It was also brought up that DESE is moving towards unit-record data. This move will enable them to gain a much clearer picture of how dual credit works for students.

It was reiterated that the work of those present could help influence solutions to any lingering issues regarding dual credit. Standards developed by these discipline groups will be adopted across public institutions, thus facilitating administration of dual-credit programs. The Committee on Transfer and Articulation (COTA – a standing subcommittee of the CBHE) is also interested in further publicizing and promoting adherence to dual credit policy and best practices.

The Spellings Report has promised that it does not intend another NCLB for higher education. Instead, it is focused on increasing accountability, affordability, and accessibility to postsecondary education, while preserving institutional flexibility in implementation. Likewise, the Higher Learning Commission has been working on accreditation and assessment issues. They are particularly concerned with assessment of student learning outcomes and in discerning measurable gains in student learning.

Historical Curriculum Alignment in Missouri

In efforts to improve on what has been done in the past, we need to look at what past practice. The Missouri K-16 Coalition was formed in the mid-90s to coordinate alignment from secondary to postsecondary education. It was driven by administrators and was not very inclusive of faculty involvement or knowledge.

In 2005, a General Education Policy and Matrix were developed. As part of this, credit transfer guidelines were created to facilitate transfer among Missouri higher education institutions. The General Education Policy, though useful, was necessarily broad, and left unanswered questions, particularly regarding equivalencies of individual coursework or degrees beyond the associate of arts.

DESE's grade-level expectations (GLEs) have undergone several revisions since 2000. Most recently, the State Board of Education has approved end-of-course examinations linked to course-level-expectations, CLEs) that would potentially compose anywhere from 10-20% of a student's grade. These evaluations would replace the MAP in the high school grades in a few core courses, and would be targeted to begin during the 2008-09 school year. The current MAP tests have been created primarily with input from secondary educators, with less input from persons in higher education. Discussion ensued regarding the impact these exams could potentially have on curriculum the secondary and postsecondary levels. Concerns were also raised about the impact these exams would have on discussions regarding college readiness.

MoDEC entry level competencies were also mentioned. Those present were reminded of the importance of faculty involvement with whatever competencies/assessments are created. DESE's grade- and course-level-expectations were also referenced. It was reiterated that all students that graduate from high school should have at least the same level of general competencies – whether they plan on going onto postsecondary education or into the workforce. The Department of Economic Development has also been pushing for this, as the vast majority of occupations in the state are on their way to becoming knowledge-based. This shift in the economic sector means that for state citizens to be employed, they will need to have the same competencies as their peers who continue into postsecondary education. It is becoming increasingly difficult for those without some sort of higher education to be able to find high-paying jobs. Engineering and technology-related jobs are particularly affected by lesser preparation in high school. Those present realized a great need to collaborate with high school faculty.

Current Missouri Drivers

Another resource for the current discussion on curriculum alignment is the Math, Engineering, Technology, and Sciences Coalition, or the "Missouri METS Coalition". This coalition is concerned with the future of Missouri's economic development. A summit last year included leaders in the education and business communities who delivered recommendations to Governor Blunt to strengthen METS-focused education and economic / workforce development in the state. These recommendations focused on the need to improve curriculum alignment across the board in these subjects and influenced the eventual passage of Senate Bill 580 and the creation of the P-20 Council.

This council includes the directors / commissioners of the Missouri Department of Higher Education (CBHE), the Department of Elementary and Secondary Education (DESE), and the Department of Economic Development (DED), as well as the presiding chairs of the CBHE and the State Board of Education.

The recently passed Senate Bill (SB) 389 is the catalyst that drives this specific project on curriculum alignment. Section 173.005 states that

*The coordinating board shall establish guidelines to promote and
58 facilitate the transfer of students between institutions of higher education within
59 the state and shall ensure that as of the 2008-2009 academic year, in
60 order to receive increases in state appropriations, all approved public
61 two- and four-year public institutions shall work with the commissioner
62 of higher education to establish agreed-upon competencies for all
63 entry-level collegiate courses in English, mathematics, foreign
64 language, sciences, and social sciences associated with an institution's
65 general education core and that the coordinating board shall establish
66 policies and procedures to ensure such courses are accepted in transfer
67 among public institutions and treated as equivalent to similar courses
68 at the receiving institutions. The department of elementary and
69 secondary education shall align such competencies with the
70 assessments found in section 160.518, RSMo, and successor assessments;*

Of particular concern is the need for alignment between DESE and MDHE. At this time, 35% of first-time graduates of Missouri public high schools who enroll in a public Missouri college or university are enrolled in remedial courses. Among other issues, students who require remediation have a far lower chance of ever completing an undergraduate degree. Only 17% of students that require remedial course work ever complete a bachelor's degree. Of course, these statistics vary by the selectivity of an institution. For example, at a highly selective institution, students who may require additional academic support are offered other solutions, such as tutoring, that are not tracked in the same way. Finally, these courses are costly, both to the student and to the institution.

Curriculum Alignment Organizational Structure

Senate Bill 389 mandated the creation of faculty-based discipline workgroups to work on curriculum alignment. After these faculty-based workgroups have met and determined the scope of the work to be done, two members from each workgroup will become a part of an overall steering committee. This steering committee will be composed of faculty members, administrators, and MDHE staff. While the official charge of this steering committee has not yet been developed, one of their primary goals will be to coordinate the efforts of the various discipline workgroups and to compile documents and recommendations for the MDHE Commissioner to present to the CBHE. The work of the discipline workgroups and the steering committee will not be tied to a concrete timeline until a better understanding of the scope of the work to be done is gained.

Vision

One of the key purposes of this meeting is for the (mostly) faculty to contribute to the MDHE their understanding of their vision of the work, and to the specific nature of a charge from the CBHE to the workgroups. For example, a potential vision from the perspective of the MDHE might be to facilitate seamless student transitions:

- 1) from secondary into postsecondary education (lower remediation rates) and
- 2) amongst higher education institutions for those who do not finish the 42 hour general education block or those who go through transfer “swirl” or concurrent enrollment. This includes transfer of appropriate knowledge as well as of course credit.

The decision of what course(s) to include as “entry-level” for a typical college freshman is up to participants in these discipline workgroups to suggest.

At this point, it may be helpful to discuss what curriculum alignment is and is not:

Curriculum alignment today is an opportunity to influence public policy. Curriculum alignment is not a road to across-the-board assessment. The goal here is to realize and to demonstrate that local autonomies can work well together, and that there is no need for statewide blanket assessments in higher education. Likewise, this is an opportunity for faculty and institutional staff to clearly describe to policymakers their perceptions of student learning in higher education; these perceptions are often influenced by others via anecdote.

Again, the work of the curriculum alignment subgroups is not viewed by the MDHE as a first step to statewide assessment tools, though MDHE staff are certainly understanding of expectations placed upon colleges and universities to independently align course outcomes and assessments. The only goal today is to create a unified voice to communicate what is needed and expected of students going into postsecondary education. It was reiterated that we need to continue to influence positive movement in course rigor at all levels.

Several concerns were raised regarding exit/entry-level competencies. In response to this concern, it was reiterated that with SB 389, the MDHE would be able to provide public policy documents to all interested stakeholders, including higher education, K-12, and students.

The workgroup broke for a working lunch during which members discussed direction and next steps. After lunch, discussion resumed on the entry-level and exit-level competencies.

Participants were first asked to describe their ideal freshman/sophomore. In the course of the discussion, two issues were brought up:

- 1) There may be some lingering issues in this area with students transferring from two-year institutions into four-year institutions, particularly regarding program accreditation.
- 2) Diverse course and program specialties complicate any discussion of an “ideal” incoming freshman or transfer student.

In order to develop some a list of competencies, the work of Ozarks Technical Community College was mentioned as a possible starting-point. As a result of assessment-drivers, OTC is creating both core (general education) competencies and degree-specific competencies. In order to graduate, a student must have mastered all of these competencies.

Everyone present agreed that in order to be ready to move into the engineering and technology “pipeline” in a postsecondary institution, a student must be ready to take calculus. Discussion ensued over how to increase the number of students that were ready for this.

Project Lead the Way (PLTW) was a model that many participants supported. PLTW is a high school curriculum for pre-engineering students. It integrates national standards for math and science courses with applied engineering/technology projects. It is a way for DESE to align itself with national standards, to encourage students to consider engineering and technology fields, and to give them the educational background that is necessary for them to succeed in these fields. Some Missouri schools have already begun to work with PLTW. A further benefit is that grants are available to high schools that use PLTW curricula. PLTW courses can also be considered to be dual-credit at many institutions. A further benefit of this is that instructors that teach these courses have to go through an intensive workshop at a local affiliate university (UM-Rolla or the Univ. of Central Missouri). This leads to greater accountability and communication between secondary and postsecondary institutions. It also lessens issues of comparability for those who teach these as dual-credit courses.

For students that do not have a PLTW program at their high school, the International Society of Education Technology has some basic standards that can inform entry level competencies.

Also of importance to participants was that guidance counselors inform students, at least by the eighth grade, what will be expected of them should they decide on an engineering/technology pathway. It was also deemed important to put a stronger emphasis on physics in high school. Making this official state policy would be beneficial. It is also necessary that DESE accommodate the time commitment that is required for students to take PLTW courses, particularly as this may decrease opportunities to take other courses. Doug Miller of DESE will be a key contact on these issues.

Participants agreed that for the first three or four semesters of any engineering or technology program, the courses and competencies are generally the same. It is not until

the fourth semester that students really begin to focus on their area of specialization. However, at Linn State Technical College, students are expected to enter the workforce directly and to not go on to a four-year institution. This creates some discrepancy in what is expected of postsecondary students in Missouri for these first four semesters.

Participants agreed that in smoothing the transition from high school to postsecondary work, that PLTW was a very good starting point. The increasing number of non-traditional students, while a big concern, could still be helped by PLTW information. The core competencies and skills that PLTW is designed to foster can be expected of non-traditional students as well. In order for this to be helpful, participants agreed that these competencies needed to become better publicized. This would aid prospective traditional AND non-traditional postsecondary students in self-selecting their program. The marketing aspects of the METS coalition and the national PLTW organization would further get the message out.

One recurring question that was raised was whether this group was going to focus on the needs of their ideal student or of all incoming students. The answer that was decided upon was that participants needed to focus on both groups. It was made clear that remediation in all forms needed to be decreased significantly. The math discipline workgroup would be working on the basic core competencies for Calculus I. Participants were adamant that anything below that course was considered to be remedial for engineering/technology students. As the math workgroup in conjunction with the steering committee was taking care of those competencies, focus was put on informing junior high, high school, and non-traditional students of what competencies they needed if they were going to be interested in pursuing the engineering/technology “pipeline”. In addition, importance was placed on marketing this avenue to students.

It was made clear that some PLTW or comparable courses could be taught either in junior high or to freshmen in high school. There were no real pre-requisites for entry into these courses. Participants determined that ACT scores were of great value in determining a student’s level of competency in certain areas – in part because of this lack of pre-requisites. Another idea was to create a test for high school sophomores to determine their current competencies and provide students with further scholastic direction. It was mentioned that the Algebra I CLE already in production could possibly do this.

In addition to more academic competencies, participants were concerned at the lack of good study habits that incoming freshmen had. It was made clear that the steering committee would be addressing this as all of the other discipline workgroups had similar concerns.

Participants agreed that as their basic goals:

- 1) To evaluate the competencies and logistics of incorporating PLTW or comparable courses with a final goal of at least 25% of high school students to have one of these courses.
- 2) To be able to communicate to P-20 policymakers the projected future demand for engineering and technology graduates.

- 3) To recruit other volunteers – particularly engineers – with a goal of one contact person at each institution.
- 4) To contact Debbie Goodall at Metro Community College.
- 5) To contact Doug Miller at DESE.

The next meeting was scheduled for Tuesday October 9 from 11:00 AM – 3:00 PM in the MDHE annex large conference room. This meeting will focus on the work done by the math and science discipline workgroups as well as what participants have learned about implementing PLTW into state curricula.

David Pope from OTC agreed to serve as the group's technology representative to the Steering Committee.