Northwest Missouri State University
Board of Regents
Date of Meeting: March 18, 2009

Cabinet Member: Kichoon Yang
Agenda Item: Rational Expectations Enrollment Plan (REEP) Progress Report

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We begin with a table recalling the annual REEP targets in terms of combined (i.e., undergraduate and graduate) student headcount[1].

Table 1. Academic Year[2] Combined Headcount REEP Targets

	Fall	Spring	Summer	AY Total
Historical	6,381	5,537	3,095	15,013
AY08	6,636	5,758	3,219	15,613
AY09	6,891	5,979	3,343	16,213
AY10	7,146	6,200	3,467	16,813
AY11	7,401	6,421	3,591	17,413
AY12	7,656	6,642	3,715	18,013

Note that each annual target represents a 4% increase from the previous year; the AY12 target represents a 20% increase from the historical enrollment level[3].

The following table compares the above targets with the actual enrollment numbers for the past two years.

Table 2. Actual Headcount Enrollment: AY08-AY09

	Fall	Spring	Summer	AY Total
AY08	6,613	5,839	3,291	15,743
AY09	6,903	6,011	NA	NA

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[1] These and other targets given in this report are from the Rational Expectations Enrollment Plan (REEP) approved by the Board of Regents at its December 14, 2007 meeting.
[2] The Academic Year 2008, for example, includes Fall 07, Spring 08, and Summer 08.
[3] The historical enrollment is by definition the average census date enrollment over the five-year period AY2003-AY2007. The historical enrollment averaged over the ten-year period, AY1998-AY2007, produces a similar number.

In many ways, the FTE or SCH enrollment data are more important than the headcount data[4].

Table 3. Academic Year Combined FTE REEP Targets

	Fall	Spring	Summer	AY Total
Historical	5,130	4,599	1,104	10,833
AY08	5,335	4,783	1,148	11,266
AY09	5,540	4,967	1,192	11,699
AY10	5,745	5,151	1,236	12,132
AY11	5,950	5,335	1,280	12,565
AY12	6,155	5,519	1,324	12,998

The following table compares the above FTE targets with the actual enrollment numbers for the past two years.

Table 4. Actual Combined FTE Enrollment: AY08-AY09

	Fall	Spring	Summer	AY Total
AY08	5,445	4,920	1,263	11,628
AY09	5,676	5,084	NA	NA

To obtain more precise enrollment data, we decompose the combined FTE number into the undergraduate FTE and the graduate FTE numbers[5].

Table 5. Academic Year Undergraduate FTE REEP Targets

	Fall	Spring	Summer	AY Total
Historical	4,747	4,250	705	9,702
AY08	4,937	4,420	733	10,090
AY09	5,127	4,590	761	10,478
AY10	5,317	4,760	789	10,866
AY11	5,507	4,930	817	11,254
AY12	5,697	5,100	845	11,642

[4] For example, to calculate the tuition and fee income we need to use the FTE or total student credit hours (SCH) produced. For the purpose of this report, one undergraduate FTE per trimester is equal to 15 SCHs; one graduate FTE per trimester is equal to 12 SCHs.

[5] Once the ratio of resident to non-resident SCHs is known – this ratio for us is about 7:3 – we can use these two FTE numbers to estimate the tuition and fee income. This method of calculating the tuition and fee income is mathematically equivalent to the much simpler method of multiplying the current year tuition income by 1.04 (with the known tuition rate), once we assume that the resident to non-resident ratio and the undergraduate to graduate ratio are constant.

Table 6. Academic Year Graduate FTE REEP Targets

	Fall	Spring	Summer	AY Total
Historical	383	348	400	1,131
AY08	398	362	416	1,176
AY09	413	376	432	1,221
AY10	428	390	448	1,266
AY11	443	404	464	1,311
AY12	458	418	480	1,356

Again, the actual enrollment for the past two years exceeds the REEP target.

Table 7. Actual Undergraduate FTE Enrollment: AY08-AY09

	Fall	Spring	Summer	AY Total
AY08	4,972	4,461	787	10,220
AY09	5,153	4,650	NA	NA

Table 8. Actual Graduate FTE Enrollment: AY08-AY09

	Fall	Spring	Summer	AY Total
AY08	473	459	476	1,408
AY09	523	434	NA	NA

To get a sense of how the Rational Expectations Enrollment Plan is actually implemented with these and related enrollment targets[6], it becomes necessary to introduce the concept of an *enrollment model*. An enrollment model[7] is a mathematical construct with the following "dependent" variables:

- Undergraduate headcount enrollment
- Graduate headcount enrollment
- Undergraduate FTE enrollment
- Graduate FTE enrollment

[6] Although we don't discuss them in the report, there are secondary enrollment targets that must be taken into consideration in implementing the REEP: for example, international students and the Missouri Academy students.

[7] A full-blown enrollment model contains a large number of equations.

The six variables determining the above four dependent variables – these are called the "independent" variables – are:

1. The number of new freshmen
2. The number of new transfer students
3. The number of new graduate students
4. Retention rates
5. Time-to-degree
6. FTE/headcount[8]

An enrollment model, then, is a mathematical function, capable of producing the four dependent variables in any given academic year by plugging in the known values of the independent variables. In what follows, we give two simple illustrations of this.

Illustration 1.

In this illustration we produce the undergraduate headcount in any given academic year under the assumption that there are no transfer students and no graduate students. Moreover, we assume that:

1. The historical undergraduate headcount = N (N is a large positive integer)
2. The number of additional (i.e., non-historical) freshmen = 100
3. Time-to-degree = 5 years
4. Retention rate = 70% first year and 100% thereafter

Assumptions #2-4 are approximations, but they tend to balance each other out in simulations.

Under these assumptions the model can be worked out using the brute force method:

- Year 1 = N + 100
- Year 2 = N + 70 + 100
- Year 3 = N + 70 + 70 + 100
- Year 4 = N + 70 + 70 + 70 + 100
- Year 5 = N + 280 + 100 = N + 380
- Year 6 = N + 350 + 100 – 70 = N + 380

Note that it takes five years to reach a stable student headcount of N + 380. *To put it another way, when you increase the number of freshmen by 100, its full impact is felt in five years with a multiplier factor of 3.8.*

[8] The two variables, FTE/headcount and time-to-degree, are actually related to each other. In fact, under certain assumptions – the curriculum rigidity and constant academic success rate assumptions – one can derive one from the other.

Illustration 2.

In this illustration, we look at the transfer student enrollment. We assume:

1. Historical undergraduate headcount = N
2. The number of additional transfer students = 100
3. Time-to-degree = 3 years
4. Retention rate = 70% first year and 100% thereafter

Again, the brute force method can be applied:

- Year 1 = N + 100
- Year 2 = N + 70 + 100
- Year 3 = N + 70 + 70 + 100 = N + 240
- Year 4 = N + 210 + 100 – 70 = N + 310 – 70 = N + 240

Thus, when you increase the number of transfers by 100, its full impact is felt in three years with a multiplier factor of 2.4.

We can do a similar calculation with the graduate student population and other student populations that are homogeneous relative to the last three independent variables listed above. A full-blown enrollment model, then, combines these calculations with additional strategic constraints such as the desired mix relative to the educational experience and revenue implications.