Accountability in higher education most often concentrates on what and how to measure performance, but less often on how it can be used for planning, managing, and teaching. Besides serving higher education's consumers, accountability measures should also serve those who plan and manage institutions, especially those engaged in managing enrollments. Since enrollment is jointly determined by internal and external factors, the use of forecasting and simulation models can help managers determine alternative future scenarios. A three-phase model has been developed that incorporates such performance measures as enrollment forecasting and retention. In the first phase of the model, the past 25 years of a college's enrollment is "explained" in terms of internal policies related to fees and financial aid; demand-related variables, such as community demographics and economics; and supply-related variables, such as college budget, staffing, and curriculum. In the second phase, the variables used to explain enrollment are modified to forecast future enrollments, while in the third the forecast model is linked to a simulation model that uses performance measures related to enrollment management to determine the effect of specific changes. Contains 10 references. Fifteen tables showing outcomes from an implementation of the model at Arizona's Maricopa County Community College District are attached. (HAA)
PERFORMANCE-BASED ENROLLMENT MANAGEMENT

Contributed Paper Presented by
Chuck McIntyre
Director of Research
Chancellor's Office, California Community Colleges

and

Director, Computer-Aided Planning (CAP)

at

37th ANNUAL AIR FORUM
Orlando, Florida
May 19, 1997
2:30 pm in Fantasia N
Disney Contemporary Resort Hotel
PERFORMANCE-BASED ENROLLMENT MANAGEMENT

Contributed Paper by
Chuck McIntyre
at 37th Annual AIR Forum

ABSTRACT

Accountability in higher education most often concentrates on what and how to measure performance, but less often on how it can be used for planning, managing, and teaching. This paper suggests that besides serving higher education's consumers, accountability measures also should serve those who plan and manage institutions: in this case, manage enrollments. Enrollment management is improved by use of a forecasting and simulation model in which "performance" measures - enrollment forecasting, enrollment management, and retention - play a major role. This work should be of interest to those who plan and manage higher education institutions, and to researchers and those conducting accountability efforts.

INTRODUCTION

Much of the discussion around higher education (HE) accountability during the past decade seems to have begun with indicators and what they were supposed to measure. Only at the very end of these discussions does the use for the indicators become apparent, if it does at all. Of course, there are exceptions to this, including Ewell (1989) who cited the need to tie assessment (as accountability was then called) of student performance to improvements in teaching and institutional management and, more recently, Gaither (1996) who argues that planning and assessment (accountability) "...should be partners."

Accountability in the private sector is accomplished for consumers by the market place. Accountability for HE, however, since it is a mixed public and private good with substantial collective benefits, most often involves large information gathering and measurement projects for HE's consumers or outside
constituents: for prospective students and their parents, and for taxpayers and their representatives (legislators and elected trustees). More emphasis should be put on using "accountability" as a tool to help trustees and their staff to plan, make policy decisions, manage their institution, and teach their classes, thereby improving student learning and justifying to a greater extent the students' and taxpayers' considerable investment in HE. One way to do this properly is to specify the specific planning, management, and teaching objective(s), then work one's way back through the information, particularly about institutional and student performance - the "accountability measures" - that are needed to help achieve the objective(s). One of the most difficult of such objectives is that of institutional enrollment management.

PURPOSE

This paper examines the enrollment issues and management problems (Chart 1) facing institutions of HE. The work begins by looking at how enrollments are determined. Much prior work of this kind relies on enrollment demand; see, for example, Brinkman and Leslie (1987) and McIntyre (1995). Brinkman and McIntyre (forthcoming 1997) argue that enrollment is jointly determined by both demand and supply; that is, by factors that are outside the institution's control, together with factors (policies, practices and results) largely within the institution's control. Sorting or modeling the impact of these factors can empirically demonstrate the impact, say, on enrollment of tuition and fee changes relative to, for instance, a particular change in the institution's service area population or relative to a change in budget or curriculum that impacts retention.

Empirical parameters from this work are used, in a second-phase, to build a forecasting model where institutional planners may cast the uncontrollable factors in different alternative future scenarios. To complete the work - as a third phase - planners then alter the controllable factors: marketing, outreach, admissions, registration, probation, dismissal, and still other measures such as counseling and improvement of instruction that are specifically designed to improve intra-course or inter-term retention.
Values for the latter indicator generally receive much attention in accountability exercises, but more important are the parameters that describe the relationship of all these outcomes to changes to internal policy and practice, given the impact of external factors. The resulting level and composition of the institution's enrollment are a function of all three phases of the modeling.

These controllable or manageable factors are usually discussed under the rubric of enrollment management, a major focus of HE during the past ten years. Enrollment management generally began with a proposed definition and context put forth by Hossler and Kemerer (1986) which examined the "tools" available for managing enrollments. Different management methods were surveyed and their integration proposed by Dolence (1989) who, more recently (1993), has advocated "strategic enrollment management" to include the uncontrollable (unmanageable) factors as well.

In the first phase of our work, a model to "explain" the past 25 years of enrollment patterns is fit with data for Maricopa (MCCCDD), a large, multi-campus community college district in metropolitan Phoenix Arizona. Besides the major policies of tuition, fees and financial aid at the college and the tuition of a major nearby competitor, Arizona State University, independent variables include those about demand: service area demographics and economics; together with those about supply: college budget, staffing and curriculum. In a limited number of cases, missing data are reconstructed either from subsidiary functions or from estimates by knowledgeable and experienced staff at the college.

The model itself is an econometric regression and considerable care is taken to avoid typical problems of multicollinearity (independent variables are highly correlated), heteroscedasticity (model errors are not, as assumed, independently distributed with constant variance), and simultaneous equation bias (Chart 2). The latter problem can confuse the direction of causation in the model, though the cures for this (two-stage least squares, etc.) sometimes causes further problems of interpretation. The usual statistics are analyzed not only for their significance, but also for their policy importance, two quite different concepts; see, for example, McCloskey and Ziliak (1996).
Results are quite satisfactory (Chart 3). Not only is the equation a good fit (with appropriate R², F-Ratio, and DW statistics), but, parameters for each of the five independent variables are significant (t values>2), with expected elasticities and signs.

Once historic enrollment patterns are "explained," the model is modified - in the second phase of the work - to forecast future enrollments, using the five independent variables plus the Phoenix area Consumer Price Index. Forecasts begin with relatively naive scenarios, partly to validate the model (Chart 4), then proceed to more-likely scenarios (Chart 5). (To construct needed future values for key variables, an expert panel can undertake an informal Delphi-like process to identify an effective consensus value or range of values for each variable.)

A final set of forecasts for Maricopa deviated from the actual result largely because we underestimated the college's budget increase (Chart 6). Had the budget been increased as we earlier predicted, the forecast would have been within 0.6% (257 FTE students) of the actual result (44,657 FTE). In any case, the model's estimates and forecasts were used by Maricopa's budget and planning group as the basis for setting both short-term 1995-96 and long-term tuition and fee policies for the college.

Once empirically fit - with robust and very sensitive statistical results - this kind of forecasting model can be connected to a simulation model - in Phase 3 - to look at possible results from what might be termed as the "micro" or at least "somewhat less-than-macro" policies for: marketing, outreach, admissions, registration; i.e., efforts that will impact first-time enrollments (Chart 7). In addition, this kind of simulation enables analysis of initiatives that will impact inter-term retention. Increases in the values of these variables, other things being equal (which they are not, but we take care of that problem simultaneously in other parts of our modeling), produce (a) significant increases in the level and (b) significant changes in the composition of a university or college's enrollment.
This structure can interact with the institutions data base and with projection models to simulate the programmatic and fiscal consequences of alternative actions and scenarios. This model can be especially useful when used in an iterative fashion by an Enrollment Management Task Force to achieve certain institutional goals, and does, at times, produce results that are quite counter-intuitive.

The simulation model uses "performance measures" for four distinct enrollment management strategies, in conjunction with more specific "pricing": tuition, fees, dormitory charges, and financial aid policies:

<table>
<thead>
<tr>
<th>Action</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>Marketing-elasticity of Applications Submitted</td>
</tr>
<tr>
<td>Admit</td>
<td>Admissions: Applications Ratios</td>
</tr>
<tr>
<td>Register or Enroll</td>
<td>New Enrollment: Admissions (&quot;Yield&quot;) Ratios</td>
</tr>
<tr>
<td>Retain</td>
<td>Retention Ratios across terms (Chart 9)</td>
</tr>
<tr>
<td>Price</td>
<td>Prices and Pricing Policies (Chart 10)</td>
</tr>
</tbody>
</table>

In a version of this model, developed for a small land-grant University in the midwest, the five enrollment management strategies are imposed upon categories of new and continuing students that have been derived, using historic matrices (Chart 11), from a dozen basic categories of students that the school used for budget and academic planning:

- undergraduate students by load (full- and part-time) and residence (on- and off-campus)
- graduate students by load (full- and part-time) and residence (on- and off-campus)
- summer session students by level (graduate, undergraduate) and residence

Once the model is run, using values for the performance measures supplied by the user, one sees the overall changes (Chart 12) resulting from specific actions (Chart 13), together with a summary of those specific actions taken and assumptions (Chart 14) in order to keep track of results in relation to actions. Also displayed are the resulting specific distributions of future enrollment by academic status, load and level, geographic origin, race and other special University student groups (Chart 15).
These results also are designed to feed into academic and budget planning models. Unfortunately, at the time the model was delivered in 1996, major staffing changes were taking place at the Midwestern University. And, to the author's knowledge, the model has not yet been implemented. Plans are currently underway to apply this methodology at Pima Community College in Arizona.

This kind of three-phased work should provide a breakthrough for colleges and universities that struggle with enrollment forecasting and enrollment management by effectively integrating both sets of activities. Commonly available and frequently used, measures of institutional and student "performance," including recruitment and retention, are key features of this work. It appears, therefore, that the real merit and proper rationale for maintaining such measures as not for vaguely-defined "accountability purposes," but rather for specific, identifiable uses like that - enrollment management - examined here.

This work can be effectively replicated at any college or university with minimal modifications that may be needed to account for less-than-adequate data or for unique needs of policymakers. It can be especially useful for private HE institutions and public liberal arts colleges that rely heavily on tuition and fees as a revenue source, whose viability depends upon effective enrollment planning and management, and where effective recruitment and retention strategies can have a major impact on the institution's condition.

REFERENCES


ISSUES RELEVANT TO COLLEGE ENROLLMENT

MANAGEABLE

Own Pricing: tuition, fees, and financial aid
Marketing and Registration
Admissions, Probation, and Dismissal
Curriculum: programs, sectioning, ...
Support: counseling, etc.
Facilities: sites, ....

UNMANAGEABLE

Competitor Pricing
Competitor policies, practices
Demographic, geographic factors
Economic: income, unemployment, prices, ....
Social and cultural factors
Public policies

*IT'S USEFUL TO KNOW THE POSSIBLE IMPACT OF ISSUES YOU CAN'T MANAGE; OTHERWISE, YOUR ACTIONS MAY HAVE UNINTENDED RESULTS!!
MODELING ISSUES AND PROBLEMS

1. EXPLANATION

Are independent variables related to enrollment?
What is the BEST form of the model?

Measures:  R—Square
           F Ratio
           Elasticities, T Values
           Durban—Watson (DW) Statistic
           Autocorrelation

2. SOME STATISTICAL ISSUES

Simultaneous Equation Bias: enrollment observations are result of intersection of supply and demand:

\[ S = f(..., D, ...) \]
\[ D = f(..., S, ...) \]

Causation problems
Intercorrelation of independent variables

3. ANALYSIS OF MODEL ERRORS OR RESIDUALS

For time series, use measures such as DW Statistic, Autocorrelation ... AND, visual presentations....
   develop "dummy variables"....
Model errors: poor specification, left something out....
Measurement errors: data incomplete or invalid....

4. FORECASTING

Can you forecast independent variables reliably?
   PROBABLY NOT; USE SCENARIOS!!
Repeated use: model menus, macros....
\[ E = f( P, Y, D, S ) \]

\begin{align*}
E &= \text{enrollment, the dependent variable, specified in headcount and FTSE} \\
P &= \text{the price of college-going, including:} \\
&\begin{itemize}
  \item tuition and fees and 
  \item other costs
  \begin{itemize}
    \item transportation 
    \item child-care, if needed 
    \item books, supplies, and miscellaneous, adjusted for financial aid; and with 
    \item unemployment (rates) used as a proxy for foregone earnings 
  \end{itemize}
\end{itemize} \\
Y &= \text{disposable income available to potential student} \\
D &= \text{demographics of potential student population} \\
S &= \text{supply of MCCCD education, including} \\
&\begin{itemize}
  \item budget (unrestricted; real: price-adjusted 
  \item major MCCCD campuses or sites 
  \item FTE faculty 
\end{itemize}
\end{align*}

\begin{tabular}{lcc}
\textbf{variable} & \textbf{e} & \textbf{t} \\
MCCCD tuition and fees & -0.40 & -5.5 \\
Maricopa income per capita & -1.51 & -3.6 \\
Maricopa population & 0.98 & 3.4 \\
MCCCD operating budget & 0.63 & 3.0 \\
ASU tuition and fees & 0.38 & 2.1 \\
\end{tabular}
**FUTURE SCENARIOS:**

A: History "repeats itself;" the next ten years repeat the pattern of the past ten years.

B: The next ten years will trend like the past four years (since 1991).

C: The next ten years will trend like the average of the past 22 years (since 1972).

D: The local economy improves substantially until 2000, after which there is a downturn. CPI increases at slightly higher rate until 2000. Budgets continue to be tight, and basic tuition and fees increase by $2/unit per year (including continued proportionate increases in other fees, a 9% per year increase). MAG projects a slowing of Maricopa County population growth rates.

Source: Appendix E.
FUTURE SCENARIOS:

G: The local economy improves substantially until 2000, after which there is a downturn. CPI increases at slightly higher rate until 2000. MCCCD Budgets increase at 8% through 2000, then 3% through 2005. Tuition and fees increase by $1/unit (3%) per year and other fees held to same % increase.

H: Like G, except that economic recovery is not as robust in near term nor does it turn down as much after 2000. Also, MCCCD budgets continue to be tight, increasing by 4% per year through 2005. Tuition and Fees up by $1/unit per year.

I: Like H, except that basic tuition and fees do NOT increase for two years, then increase by $2/unit every other year, beginning with 1997–98.

J: Like I, except that basic tuition and fees increase by $2/unit in 1995–96, and every other year thereafter.
Chart 6

FTSE FORECAST
MCCCD, 1972–2005

Full – Time Student Equivalents (FTSE)
(Thousands)

Model Residual  △ Actual  − Estimated

SCENARIOS

Annual Changes:

<table>
<thead>
<tr>
<th>Est'd</th>
<th>Actual</th>
<th>96–97</th>
<th>1997 and beyond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition and Fees</td>
<td>+$2/cu</td>
<td>+$2/cu</td>
<td>$0chg.</td>
</tr>
<tr>
<td>Budget</td>
<td>+4%</td>
<td>+8%</td>
<td>Increases at 1% point &gt; income/capita increase</td>
</tr>
<tr>
<td>ASU T&amp;Fees</td>
<td>+8.2%</td>
<td>+3%</td>
<td>+3%</td>
</tr>
<tr>
<td>Income/Capita</td>
<td>+7%</td>
<td>+7%</td>
<td>+8%</td>
</tr>
<tr>
<td>Population</td>
<td>+2.5%</td>
<td>+2.6%</td>
<td>+2.6%</td>
</tr>
<tr>
<td>CPI</td>
<td>+5%</td>
<td>+6%</td>
<td>+5.5%</td>
</tr>
</tbody>
</table>

FTSE Forecast 43769 44400, using actual 95–96 values for independent variables
FTSE Actual 44657 44657
Difference 888 257
2.0% 0.6%

04/28/97 MCCCD97/ah106
ENROLLMENT MANAGEMENT (ENRLMGMNT)

1) MARKETING
This first routine provides historic data on marketing expenditures and applications (APP/MKTG), which (with proposed future marketing) projects future student applications by residence...

2) ADMISSIONS
Historic admissions/applications ratios (ADM/APP) are projected, given future plans for admissions standards and processes...

3) REGISTRATION/ENROLLMENT
Historic new enrollment/admissions ratios (NENR/ADM) are projected, given future plans for registration processes....and for curriculum, sectioning, scheduling....

for the fall terms..., then:

winter and spring terms are projected as ratios of fall (W,S/F), based on history...

4) RETENTION
Historic retention rates (CENR/TENR) for:
(a) Winter, Spg Continuing/Fall Enrollment
(b) Fall Continuing/Spring Enrollment
are used to project future new and continuing students...given plans about retention...

Historic data on student residence/load/status readies enrollment count for...

5) PRICING
This routine takes historic data for student costs price—elasticities and projected future policies on: tuition, fees and financial aid to produce enrollment numbers for other CAP model routines....
STRUCTURE OF CAP SIMULATION MODEL

MODEL CONTROL

DATA BASE
GENERAL OPERATIONS

DATA BASE
RESTRICTED OPERATIONS

DATA BASE
AUXILIARY ENTERPRISES

PROJECTIONS
GENERAL OPERATIONS

PROJECTIONS
RESTRICTED OPERATIONS

PROJECTIONS
AUXILIARY ENTERPRISES

ENROLLMENT MANAGEMENT
Chart 9

MIDWEST UNIVERSITY

RETENTION RATES
Five-Year Actual; Six-Year Estimate

<table>
<thead>
<tr>
<th>Year</th>
<th>Fall Actual</th>
<th>Spring Actual</th>
<th>Summer Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>0.65</td>
<td>0.77</td>
<td>0.36</td>
</tr>
<tr>
<td>1991</td>
<td>0.65</td>
<td>0.77</td>
<td>0.36</td>
</tr>
<tr>
<td>1992</td>
<td>0.65</td>
<td>0.77</td>
<td>0.36</td>
</tr>
<tr>
<td>1993</td>
<td>0.65</td>
<td>0.77</td>
<td>0.31</td>
</tr>
<tr>
<td>1994</td>
<td>0.62</td>
<td>0.77</td>
<td>0.27</td>
</tr>
<tr>
<td>1995</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
<tr>
<td>1996</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
<tr>
<td>1997</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
<tr>
<td>1998</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
<tr>
<td>1999</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
<tr>
<td>2000</td>
<td>0.62</td>
<td>0.77</td>
<td>0.28</td>
</tr>
</tbody>
</table>

Source: Office of Institutional Research and Planning.
## ANNUAL COST BY STUDENT TYPE, 1993–94

<table>
<thead>
<tr>
<th></th>
<th>Tuition</th>
<th>Fees</th>
<th>Rm/Brd</th>
<th>Transp’t</th>
<th>Books</th>
<th>Other1</th>
<th>Other2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESIDENT HALL UG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>$1,920</td>
<td>$104</td>
<td>$2,670</td>
<td>$540</td>
<td>$630</td>
<td></td>
<td></td>
<td>$5,864</td>
</tr>
<tr>
<td>PT</td>
<td>$912</td>
<td>$104</td>
<td>$2,670</td>
<td>$540</td>
<td>$630</td>
<td></td>
<td></td>
<td>$4,856</td>
</tr>
<tr>
<td>NR FT</td>
<td>$3,809</td>
<td>$104</td>
<td>$2,670</td>
<td>$540</td>
<td>$630</td>
<td></td>
<td></td>
<td>$7,753</td>
</tr>
<tr>
<td>PT</td>
<td>$1,969</td>
<td>$104</td>
<td>$2,670</td>
<td>$540</td>
<td>$630</td>
<td></td>
<td></td>
<td>$5,913</td>
</tr>
<tr>
<td><strong>COMMUTING UG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>$1,920</td>
<td>$104</td>
<td>$3,500</td>
<td>$720</td>
<td>$630</td>
<td></td>
<td></td>
<td>$6,874</td>
</tr>
<tr>
<td>PT</td>
<td>$912</td>
<td>$104</td>
<td>$2,000</td>
<td>$500</td>
<td>$400</td>
<td></td>
<td></td>
<td>$3,916</td>
</tr>
<tr>
<td>NR FT</td>
<td>$3,809</td>
<td>$104</td>
<td>$3,500</td>
<td>$720</td>
<td>$630</td>
<td></td>
<td></td>
<td>$8,763</td>
</tr>
<tr>
<td>PT</td>
<td>$1,969</td>
<td>$104</td>
<td>$2,000</td>
<td>$500</td>
<td>$400</td>
<td></td>
<td></td>
<td>$4,973</td>
</tr>
<tr>
<td><strong>GRADUATE STUDENT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>$2,051</td>
<td>$104</td>
<td>$3,500</td>
<td>$650</td>
<td>$630</td>
<td></td>
<td></td>
<td>$6,935</td>
</tr>
<tr>
<td>PT</td>
<td>$719</td>
<td>$104</td>
<td>$2,000</td>
<td>$400</td>
<td>$400</td>
<td></td>
<td></td>
<td>$3,623</td>
</tr>
<tr>
<td>NR FT</td>
<td>$4,422</td>
<td>$104</td>
<td>$3,500</td>
<td>$650</td>
<td>$630</td>
<td></td>
<td></td>
<td>$9,306</td>
</tr>
<tr>
<td>PT</td>
<td>$1,549</td>
<td>$104</td>
<td>$2,000</td>
<td>$400</td>
<td>$400</td>
<td></td>
<td></td>
<td>$4,453</td>
</tr>
</tbody>
</table>

Review, then press ENTER to proceed!

### POLICY ON PRICE INCREASES

<table>
<thead>
<tr>
<th>Year</th>
<th>Tuition per SCH</th>
<th>Percent Annual Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>$55.00</td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>$55.00</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>$61.00</td>
<td>6.0% 2.8% 2.3%</td>
</tr>
<tr>
<td>1993</td>
<td>$68.00</td>
<td>5.0% 4.0% 4.8%</td>
</tr>
<tr>
<td>1994</td>
<td>$75.00</td>
<td>4.0% 4.0% 4.0%</td>
</tr>
<tr>
<td>1995</td>
<td>$79.50</td>
<td>5.0% 4.0% 4.8%</td>
</tr>
<tr>
<td>1996</td>
<td>$83.50</td>
<td>4.0% 4.0% 4.5%</td>
</tr>
<tr>
<td>1997</td>
<td>$87.70</td>
<td>4.0% 4.0% 4.5%</td>
</tr>
<tr>
<td>1998</td>
<td>$92.10</td>
<td>4.0% 4.0% 4.5%</td>
</tr>
<tr>
<td>1999</td>
<td>$95.80</td>
<td>4.0% 4.0% 4.5%</td>
</tr>
<tr>
<td>2000</td>
<td>$99.60</td>
<td>4.0% 4.0% 4.5%</td>
</tr>
</tbody>
</table>

< Review history, and projections from PROJECT1,3:

When done, press ENTER to proceed.
### AVERAGE ANNUAL ENROLLMENT, ACADEMIC 1993–94

#### Race by Area of Origin

<table>
<thead>
<tr>
<th></th>
<th>CnMO</th>
<th>StL/KC</th>
<th>OtMO</th>
<th>NonST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>205</td>
<td>393</td>
<td>93</td>
<td>253</td>
<td>944</td>
</tr>
<tr>
<td>White</td>
<td>2155</td>
<td>41</td>
<td>252</td>
<td>32</td>
<td>2480</td>
</tr>
<tr>
<td>Other Minority</td>
<td>40</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>52</td>
</tr>
<tr>
<td>Alien or Unknown</td>
<td>24</td>
<td>2</td>
<td>4</td>
<td>54</td>
<td>84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2424</td>
<td>438</td>
<td>351</td>
<td>347</td>
<td>3560</td>
</tr>
</tbody>
</table>

#### Ratio to Total

<table>
<thead>
<tr>
<th></th>
<th>CnMO</th>
<th>StL/KC</th>
<th>OtMO</th>
<th>NonST</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>0.085</td>
<td>0.897</td>
<td>0.265</td>
<td>0.729</td>
<td>0.265</td>
</tr>
<tr>
<td>White</td>
<td>0.889</td>
<td>0.094</td>
<td>0.718</td>
<td>0.092</td>
<td>0.697</td>
</tr>
<tr>
<td>Other Minority</td>
<td>0.017</td>
<td>0.005</td>
<td>0.006</td>
<td>0.023</td>
<td>0.015</td>
</tr>
<tr>
<td>Alien or Unknown</td>
<td>0.010</td>
<td>0.005</td>
<td>0.011</td>
<td>0.156</td>
<td>0.024</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

### DISTRIBUTION OF STUDENTS, ANNUAL AVERAGE REGULAR TERMS 1993–94

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RSHallUG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>260</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>260</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NR FT</td>
<td>159</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>159</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>CommutUG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NR FT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>GRADUATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ResFT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NR FT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>419</td>
<td>380</td>
<td>146</td>
<td>1262</td>
<td>939</td>
<td>102</td>
<td>312</td>
<td>3560</td>
</tr>
</tbody>
</table>
Changes in ENROLLMENT from ENROLLMENT MANAGEMENT
Compared to DEMAND POTENTIAL AVERAGE ANNUAL ENROLLMENT

<table>
<thead>
<tr>
<th>Year</th>
<th>AVE.ANNUAL</th>
<th>FALL</th>
<th>SPRING</th>
<th>AVE.ANNUAL</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>2978</td>
<td>3063</td>
<td>2893</td>
<td>2978</td>
<td>0</td>
</tr>
<tr>
<td>1991</td>
<td>3453</td>
<td>3619</td>
<td>3287</td>
<td>3453</td>
<td>0</td>
</tr>
<tr>
<td>1992</td>
<td>3885</td>
<td>4101</td>
<td>3669</td>
<td>3885</td>
<td>0</td>
</tr>
<tr>
<td>1993</td>
<td>3555</td>
<td>4031</td>
<td>3679</td>
<td>3555</td>
<td>0</td>
</tr>
<tr>
<td>1994</td>
<td>3560</td>
<td>3623</td>
<td>3498</td>
<td>3560</td>
<td>0</td>
</tr>
<tr>
<td>1995</td>
<td>3561</td>
<td>3953</td>
<td>3699</td>
<td>3814</td>
<td>253</td>
</tr>
<tr>
<td>1996</td>
<td>3561</td>
<td>3962</td>
<td>3645</td>
<td>3799</td>
<td>239</td>
</tr>
<tr>
<td>1997</td>
<td>3561</td>
<td>3799</td>
<td>3473</td>
<td>3632</td>
<td>72</td>
</tr>
<tr>
<td>1998</td>
<td>3561</td>
<td>3574</td>
<td>3258</td>
<td>3412</td>
<td>-148</td>
</tr>
<tr>
<td>1999</td>
<td>3561</td>
<td>3907</td>
<td>3670</td>
<td>3788</td>
<td>228</td>
</tr>
<tr>
<td>2000</td>
<td>3561</td>
<td>4018</td>
<td>3703</td>
<td>3861</td>
<td>300</td>
</tr>
</tbody>
</table>

SOURCE: Office of Institutional Research and Planning.

05/15/97
Changes in ENROLLMENT from
ENROLLMENT MANAGEMENT ACTIONS AND ASSUMPTIONS

MARKET  ADMIT  REGISTER  RETAIN  PRICE
(Average Annual Values)  (Average Annual Values)

1990
1991
1992
1993
1994
1995  360  3  -161  0  -31
1996  253  3  -149  0  -11
1997  155  3  -138  0  -10
1998  64   2  -127  0  -9
1999  414  3  -168  0  -1
2000  303  3  -155  0  0

NOTE: The changes attributable to each action are independently calculated; therefore, their sum will not equal the net overall impact of these interrelated actions!
ASSUMPTIONS/ACTIONS for ENROLLMENT MANAGEMENT, Scenario: B
05/15/97 15:54

MARKET TO NEW STUDENTS
Projected # apps based on: "elasticity" method. Mktg E = 2.00
Distribution of apps: Future distribution based on PLUGGED VALUES!
NOTE: Increase marketing budget to $145,000 (up 25%) in 1995
and to $175,000 in 1999.

ADMIT NEW STUDENTS
Ratio Admits to Apps: Future admissions based on CURRENT YEAR practices!
NOTE: No change: 90% from local; 80% from nearby metro areas;
85% from elsewhere in state; 75% from out-of-state.

REGISTER AND ENROLL NEW STUDENTS
Ratio of Fall to Admits: Future enrollment based on CURRENT registration practices!
Ratio Spring to Fall: Projection uses "PLUGGED" values for future ratios!
Ratio Summer to Fall: Projection uses CURRENT year ratio!
NOTE: No change in registration processes...constant ratio for fall: 75%.
Correction for Spring 1994 miscount...

FUTURE CURRICULUM CHANGES LIKELY TO IMPACT ENROLLMENT? NO

RETAIN CONTINUING STUDENTS
From Fall to Spring Term: Current ratio! 0.77 : now 0.77 : in 6 years
From Spring to Summer Term: Current ratio! 0.27 : now 0.28 : in 6 years
From Spring to Fall Term: Current ratio! 0.62 : now 0.62 : in 6 years
NOTE: Virtually no change....

PRICE ALL STUDENTS
Price elasticity = -1.2 .....by income level:
low: mid: high:
-2.1 -1.05 -0.45
Percent of students on aid, by income level:
low: mid: high:
60% 25% 5%

Students on aid? 1= Yes, 0=No.
Types: In Res.Halls Commuting Graduate
Resident, FT 1 1 1
Resident, PT 1 0 0
Nonres. FT 1 1 1
Nonres. PT 1 0 0
NOTE:
## AVERAGE ANNUAL HEADCOUNT ENROLLMENT by STUDENT GROUP

<table>
<thead>
<tr>
<th>YEAR</th>
<th>(1) TradAge</th>
<th>(2) TradAge</th>
<th>(3) NTrAge</th>
<th>(4) NTrAge</th>
<th>(5) Other Graduate</th>
<th>(6) Min/Int</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>AfrAm</td>
<td>AfrAm</td>
<td>AfrAm</td>
<td>White</td>
<td>White</td>
<td>Min/Int</td>
<td>3560</td>
</tr>
<tr>
<td>1991</td>
<td>419</td>
<td>380</td>
<td>146</td>
<td>1262</td>
<td>939</td>
<td>102</td>
<td>312</td>
</tr>
<tr>
<td>1992</td>
<td>ResHall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>459</td>
<td>404</td>
<td>155</td>
<td>1346</td>
<td>1002</td>
<td>108</td>
<td>339</td>
</tr>
<tr>
<td>1995</td>
<td>449</td>
<td>405</td>
<td>156</td>
<td>1346</td>
<td>1001</td>
<td>109</td>
<td>334</td>
</tr>
<tr>
<td>1996</td>
<td>427</td>
<td>388</td>
<td>149</td>
<td>1288</td>
<td>958</td>
<td>104</td>
<td>318</td>
</tr>
<tr>
<td>1997</td>
<td>399</td>
<td>365</td>
<td>140</td>
<td>1211</td>
<td>901</td>
<td>98</td>
<td>298</td>
</tr>
<tr>
<td>1998</td>
<td>461</td>
<td>400</td>
<td>154</td>
<td>1333</td>
<td>994</td>
<td>107</td>
<td>339</td>
</tr>
<tr>
<td>1999</td>
<td>460</td>
<td>411</td>
<td>158</td>
<td>1365</td>
<td>1016</td>
<td>110</td>
<td>341</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Office of Institutional Research and Planning.

05/15/97
REPRODUCTION RELEASE
(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Performance-Based Enrollment Management

Author(s): Chuck McIntyre

Corporate Source: Paper Presented at 37th Annual Air Forum

Publication Date: May 1997

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic/optical media, and sold through the ERIC Document Reproduction Service (EDRS) or other ERIC vendors. Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following two options and sign at the bottom of the page.

Check here For Level 1 Release:

Level 1

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Signature:

Organization/Address:

CCU, Community Colleges

11075 F Street

Sutter Creek, CA 95685

Check here For Level 2 Release:

Level 2

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY

Signature:

Director, Research & Analysis

Telephone: (916) 327-5587

Fax: 327-5589

E-Mail Address: cmintyf@cal.edu

CCCOE.EDU