MEMO: 03-23

July 16, 2003

TO: Chief Instructional Officers
    Deans of Occupational Education
    Chief Student Services Officers
    Nursing Program Directors
    Academic Senate Presidents
    Student Equity Coordinators
    Matriculation Coordinators

FROM: Dona Boatright, Interim Vice Chancellor
       Educational Services

SUBJECT: Advisory on Use of “Model Prerequisites” for Enrollment in Associate Degree Nursing Programs (ADN)

The purpose of this advisory is to assist colleges that are considering adopting the measures that resulted from the *ADN Model Prerequisites Validation Study*. The study was conducted under a grant from the Chancellor's Office in response to concerns about the success and retention rates of students in community college registered nursing programs.

BACKGROUND

In 2000 the Chancellor's Office participated with the other higher education segments in writing a report, *Educating California's Future Nursing Workforce*, that was required by AB655 (Scott) [Chapter 954, 1999]. The report indicates that California will have a shortfall of 25,000 nurses within six years if changes in the health care industry and higher education do not occur. This shortfall will result in a public health crisis for the growing and aging population. The impending nursing shortage in California is described as unlike any the state has experienced in the past. The quality of patient care is in jeopardy. An insufficient supply of trained nurses threatens to jeopardize public health. The attractiveness of the profession to those seeking to enter nursing is eroded by understaffed facilities that result in additional overtime work hours and increased workloads. These factors lead to greater attrition of current nurses. *Educating California’s Future Nursing Workforce* reported on issues of concern to community colleges:

1) Enrollments are at capacity in most areas of the state;
2) competition has increased for clinical placement of students in health care facilities;
3) there is an apparent 25% attrition rate in registered nursing education programs;
4) the timeline for associate degree nurses to complete bachelor’s and Master’s degrees in nursing has become prolonged;
5) faculty compensation packages make it difficult to recruit ADN faculty;
6) nursing and allied health programs have relatively high costs, due to low faculty/student ratio; and
7) equipment and supplies for “state of the art” instruction have become increasingly expensive.

The focus of this advisory is number 3 above, the apparent 25% attrition rate. Directors of community college nursing programs point out that the successful completion rate for students in nursing programs has fallen dramatically in recent years. In the early 1990’s, about 85% of all nursing students successfully completed their programs. In recent years the successful completion rate has dropped to about 73%. Nursing program directors suggest the reason for this drop is that most community colleges previously used ranking methods (GPA, usually) to select students for the limited enrollment slots that were available. In the mid 1990’s, the Chancellor's Office determined that the ranking methods used by many nursing programs to select students for limited enrollment slots violated various Board regulations related to open access and the establishment of prerequisites. To validate their previous practices, colleges have to demonstrate that the student who does not meet a particular standard or criterion would be highly unlikely to receive a satisfactory grade in the course (Title 5, Section 55201[c][2]). However, individual colleges generally did not have the research capacity or resources to validate previous practices. In lieu of validation, several non-evaluative selection techniques were recommended. These included first-come-first-served, lottery, or random selection systems. Many ADN program directors believe that the implementation of such non-evaluative systems reduced the number of students who successfully completed nursing programs. Thus, the prerequisite study was requested by a task force formed by the Chancellor to look at ways to identify and validate prerequisite knowledge and skills for enrollment in Associate Degree Nursing (ADN) programs.

THE STUDY

In response to the request, the Chancellor’s Office awarded a Fund for Student Success program grant to Los Rios Community College District. The grant award was to conduct research on the factors that define the likelihood of student success in ADN programs. The intent was to establish a model set of prerequisites for possible subsequent use by any other college in the state, provided that validation was established in six districts. Los Rios subcontracted with the Center for Student Success to conduct the research. The study was completed in the spring of 2002.

The study used data obtained from a consortium of twenty community college ADN programs. Five cohorts of students who enrolled in the nursing programs during the academic years of 1994-95 through 1998-99 were studied longitudinally to determine progress and performance.
The essential finding of the study is that four factors best predict student success in completing nursing programs: overall college grade point average (GPA), English GPA, Core Biology GPA (Anatomy, Physiology, Microbiology), and Core Biology course repetitions. (Students with fewer repetitions have a higher probability of success.) The researchers propose a composite formula model that demonstrates an improvement in current success rates of ADN program students.[1]

It is appropriate to consider potential risks of implementing this research. The adoption of the prerequisite measures and the implementation of the composite formula could result in rationing access. Unless the implementation of these measures is done carefully according to the guidelines discussed later in this memo, it could conflict with the requirement for open access.

At the same time, it is important to consider the fact that California is experiencing a major nursing shortage. It's imperative that efforts are focused aggressively on increasing the number of enrollment opportunities in nursing programs. Recent data indicate that we have over 6,100 fully qualified applicants attempting to enroll in community college nursing programs with only 3,800 spaces available. The huge demand for nurses cannot be met by simply increasing the completion rates of community college programs by 10%. The biggest part of the solution is in increasing the number of spaces; the lesser part of the solution is in improving success rates.

California also needs a nursing workforce that reflects its population. Currently, of all community college nursing enrollees, 9% are African American, 20% are Asian, 21% are Hispanic, and 43.5% are white. These numbers reflect the community college population of enrollees, which are, 7% African American, 16% Asian, 27% Hispanic, and 40% white. Of the community college programs participating in the study, nursing enrollees were 6% African American, 9% Asian, 14% Hispanic/Latino, and 51% White. These percentages strongly suggest a need to do a better job of outreach both college wide and for nursing programs. In terms of program completion for those programs that participated in the study, the average rate was 73%, with African Americans at 57%, Asians at 64%, Hispanics/Latinos at 75%, and Whites at 84%. These numbers indicate a need to focus our attention on ways we can ensure equal opportunity for all to enter and succeed in nursing programs.

The issue of equity is critically important when the impact of the selection factors identified in the study is considered. When methods such as a lottery or "first come/first served" were used in selecting students, 5% were African Americans and 15% were Latinos. In the study when the four-factor selection method and a cut score of 70% were used, 4% were African Americans and 14% were Latinos. On the other hand, all ethnic groups, once selected, had higher completion rates than they would have had under the lottery or "first come/first served" methods. For instance, African American student success rates would go from 59% to 74%, and Latino success rates would go from 77% to 81%.

[1] Attached to this document is a brief description of the findings of the study and Excel spreadsheets implementing the formula and determining disproportionate impact. The complete report on the study and the composite formula may be found at the following website: http://www.healthoccupations.org/resources.cfm
A multi-part strategy must be pursued: 1) aggressively increase the number of nursing slots available in college programs, 2) do more outreach in terms of recruiting students to the programs, 3) have counseling, advice, and supplementary instruction intervention strategies in place to help students understand their options and overcome obstacles to success, and 4) carefully implement methods that fairly determine the order in which students are served.

**VOLUNTARY IMPLEMENTATION**

Districts may choose to adopt the measures recommended in the study as a prerequisite. Use of these measures is strictly voluntary. If the decision is made to adopt the measures as a prerequisite, and to set cut scores that will result in defined program completion rates, then districts must analyze and monitor the possibility of disproportionate impact on particular groups of students defined in terms of race, ethnicity, gender, age, or disability (Title 5, Section 55201[e][2][B]).

**IMPLEMENTATION**

Districts that choose to implement the measures proposed by this study, and to select students for enrollment on the basis of a resulting mathematical score, should do the following:

- Analyze the data provided by the study to identify an enrollment score that improves performance in the program.
- Use historical data about students who have been enrolled in the program in the past to determine if the identified score would have caused disproportionate impact on the student population had it been in place. If the score results in disproportionate impact, take action to ameliorate it, as discussed below under “Addressing Disproportionate Impact.” Or refer to 4th bullet below.
- Identify new enrollment criteria in college publications, which are available to students, well in advance of implementation. Advertise new enrollment criteria over a period of a year prior to implementation to allow students enough time to know what they need to do to enroll in the nursing program.
- Use a prospective approach to studying disproportionate impact. If a study of the historical data results shows disproportionate impact, a future implementation date should be set and the criteria for entrance advertised (as stated in bullet # 3). Monitor student performance during this time and do a second test for adverse impact.
- Conduct recruitment and outreach activities to increase the pool of diverse applicants.
- Provide sufficient student support activities, such as mentoring and tutoring, to ensure successful completion of the program. Refer students to well-established supportive services that already exist on campus, such as learning assistance centers, counselor-led workshops, and peer support groups.
• Once the new prerequisite system is implemented, monitor student performance to
determine whether there is disproportionate impact. If disproportionate impact occurs,
take action to ameliorate it, as discussed below under “Addressing Disproportionate
Impact.”

COMPLIANCE WITH TITLE 5 REGULATIONS

Board of Governors regulations on prerequisites (Title 5, Sections 55200 et seq.) and
matriculation (Title 5, Section 55500 et seq.) set limits on the circumstances under which
prerequisite requirements or assessment procedures can be used by districts to determine which
students may enroll in a course, and by extension, in a particular program.

The Chancellor’s Office has determined that using the nursing program enrollment measures
recommended in the ADN Prerequisite Validation Study would not violate these provisions of
law—provided, however, that steps are taken to monitor and address any disproportionate
impact, as discussed below. In terms of the matriculation regulations, the measures proposed in
the study meet the requirement that assessment use multiple measures (Title 5, Section
55521[a][3]). In terms of the prerequisite regulations, the measures meet the requirements of
having been validated for colleges in more than six different districts (Title 5, Section 55201
[e][2][A]). The study also demonstrates that the measures are highly correlated with student
success. Colleges interested in utilizing such measures must demonstrate that the student who
does not meet a particular standard or criterion would be highly unlikely to receive a satisfactory
grade in the course (Title 5, Section 55201[c][2]).

ADDRESSING DISPROPORTIONATE IMPACT

The ADN Model Prerequisites Validation Study demonstrates that applying the proposed
measures would result in a significant increase in the proportion of nursing students who
successfully complete the program. The increases in completion rates are most dramatic among
some ethnic groups, especially African-Americans. On the other hand, applying the measures
may result in some students not being selected for enrollment who would have been selected
using other measures. In the study, all groups experienced a decrease in the number of students
selected (ranging from 11% to 31%), however, some groups were impacted to a greater degree
than others.

If a district decides to use the nursing program enrollment measures, Title 5 regulations require
that the district conduct an evaluation to determine whether its use in program enrollment has a
disproportionate impact “on particular groups of students described in terms of race, ethnicity,
gender, age or disability, as defined by the Chancellor” (Section 55201[e][2][b]).

Title 5 describes disproportionate impact as occurring “when the percentage of persons from a
particular racial, ethnic, gender, age or disability group who are directed to a particular service or
placement based on an assessment instrument, method, or procedure is significantly different
from the representation of that group in the population of persons being assessed, and that
discrepancy is not justified by empirical evidence demonstrating that the assessment instrument,
method or procedure is a valid and reliable predictor of performance in the relevant education setting (Title 5, Section 55502[e]).” Although Title 5 does not contain a specific definition of “disproportionate impact” for this purpose, the Chancellor’s Office advises that the standard to be applied is the one generally used in nondiscrimination guidelines for employment. Under this standard, disproportionate impact occurs if the selection rate for a particular group is less than 80 percent of the selection rate for the group with the highest selection rate (4/5 rule).

If a district’s analysis of the results of applying the nursing program enrollment measures shows that its application causes disproportionate impact, the district must take action to address the problem. Since the proposed measures result in calculating a numerical score for each applicant, the district may adjust the “cut-off score” used for enrollment in the nursing program, to arrive at a level that would eliminate statistical disproportionate impact as described above, while still significantly enhancing nursing program completion rates. This approach requires careful balancing of equity and outcome considerations, but it is the best approach when a district concludes that it is feasible.

If statistically disproportionate impact on a group continues to occur, the district is required by law to develop and implement, in consultation with the Chancellor’s Office, a plan setting forth steps it will take to correct the disproportionate impact. While there are many possible types of corrective action, some examples of elements that might be included in such a plan are:

- All groups should be made comfortable and welcome on campus, and in the nursing program, by fostering sensitive attitudes on the part of students, faculty, and staff.
- Increased contact between students and faculty outside of the classroom, such as mentoring, tutoring, counseling, advising, and student activities should be encouraged.
- Rewards and recognitions should be established for nursing faculty who take multicultural training or training in teaching methodologies shown to increase student success.
- Community colleges should increase their cooperative efforts with high schools to prepare students for college work, including the use of summer "bridge" programs. Such programs could include a component designed especially for high school students who have a desire to enter nursing as a career.
- More tutorial assistance should be provided, and tutorial programs should be designed with the involvement of faculty.
- Special recruitment materials for the nursing program should be targeted to promote diversity.

Attachment A - Using the Predicted Probability of Success Formula to Select ADN Program Students
Appendix A -- **Strategy for Implementing the ADN Prerequisite Model** and **Guidelines to Evaluate Effectiveness of Selection Model at Your College**. These two documents provide suggestions for implementing the model and steps for evaluating the effectiveness of the model at local college campuses.

Appendix B – **Worksheet to Evaluate the Effectiveness of Selection Model**. This Excel workbook provides instructions, a sample work sheet, and a data entry work sheet for inputting data about past students who have been enrolled in the nursing program, and a Completion Analysis Sheet to determine if the ADN Prerequisite Model is viable for your college.

Appendix C -- **Work Sheet to Implement Formula for Determining Enrollment and Disproportionate Impact** - These documents provide instructions and an excel spreadsheet with basic formulas for implementing the Model and determining disproportionate impact using the 4/5 rule.

Appendix D -- **Calculations for Adverse Impact in Selection** - This document addresses various statistical issues colleges may face in applying the rule or process to determine disproportionate impact.

Appendix E -- **Expanding the Workbooks to Accommodate More Than 190 Applicants / Students** – This document addresses how to expand the workbooks to accommodate more than 190 entries by extending the formulas to accommodate the number of students you have for analysis.

**QUESTIONS?**

For questions or additional information, please contact the following persons:

For questions about the study and the recommended formula:

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cc:  Chief Executive Officers
In June 2002, the Center for Student Success completed a study to determine the most effective prerequisites in predicting Associate Degree Nursing (ADN) program completion. Using historical data from 20 community colleges, a total of 5,007 records were analyzed and the following factors were associated with ADN completion:

- Overall college grade point average
- English courses grade point average
- Composite grade point average of core Biology courses (Anatomy, Physiology and Microbiology)
- Number of repeats in core Biology

The following formula is used to determine a predicted probability of success.

\[
\text{exp}(-1.3907+.3465(\text{College GPA})+.3139(\text{English GPA})+.267(\text{Biology GPA})-1.0279(\text{Biology Reps}))
\]

\[
(1+\text{exp}(-1.3907+.3465(\text{College GPA})+.3139(\text{English GPA})+.267(\text{Biology GPA})-1.0279(\text{Biology Reps})))
\]

Note that this is a logistic regression formula, therefore, numeric weights are attached to each factor. Moreover, the “exp” function above enables the output to display a predictive probability of success between 0 and 1. Thus, colleges using the formula can view a predicted probability of success based on an easily understood statistic – a percentage. While the technical merits of the formula are not appropriate for discussion here, it is important to note that colleges can employ the formula using the attached spreadsheet.

To use the formula, colleges need to collect the above data from college transcripts or their own management information system and enter the relevant information into the spreadsheet. The data can be entered by hand into the system and the elements are as follows:

- Student – college student identification name or number
- College GPA – the GPA earned by the student in all courses at or above the collegiate level (basic skills courses are not included)
- Core Biology GPA – the combined GPA of the student’s grades in Anatomy, Physiology and Microbiology
Biology repetitions – taken as a fraction or whole number and computed as follows: if a student attempts three core biology courses and has to repeat one, then the number entered would be .33 or one over three. The numerator is the number of repeats and the denominator is the number of core biology courses (usually two or three). In another example, if a student repeats all three core biology courses once, a college would enter “1” representing three divided by three. If a student has no repeats of core biology courses, then the college would enter a “0”.

Once data entry is complete, a predicted probability of success is displayed. This predicted probability represents the point at which the colleges can set their probability of completion.