COLORADO ADMISSIONS STANDARD POLICY IMPACT STUDY

Prepared for the Colorado Department of Higher Education

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Introduction

In the spring of 2012, the Colorado Department of Higher Education (CDHE) contracted with Colorado Mesa University (CMU) to examine both the integrity and efficacy of the current Colorado Admissions Index.

The index was first constructed in 1986 in response to C.R.S 23 Articles 40-56 and the establishment of the institutional roles and missions as they pertain to selectivity. As originally constructed, four variables were examined which included entering student high school GPA, high school class rank, ACT score and SAT score. Two distinct components of the index were subsequently calculated, the high school performance component and the standardized test component.

In order to construct the two components of the index, an equating methodology was utilized to align high school GPA with high school class rank and ACT with SAT from the population of applicants in the state. Once aligned, those measures were each standardized using a simple standardization algorithm $(((x - \mu) / \sigma) + 50)$ with the intention of setting the midpoint, or average of both components at a score of 50. The two components were then subsequently summed to create the actual admission index. That said, the intent was to set the midpoint, or average admission index score at 100.

In 2003, an extensive review of the admission policy was conducted, and it was discovered, mainly because of grade inflation, that the high school performance component of the index was misaligned, mainly due to grade inflation between 1986 and 2003. Analyses were also conducted to determine the predictive validity of the variables of the index, as well as self-reported high school course taking patterns as identified from a file of Colorado students provided by ACT. As ACT is the mandated test for public high school students in Colorado in the 11th grade, data were fairly comprehensive and were subsequently merged with data from the

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CDHE Student Unit Record Data System (SURDS) in order to analyze all of the variables of interest. A comprehensive review of the literature was also done at that time in order to more completely inform the variables necessary for review. As a result, data were also obtained from the Colorado Department of Education (CDE) which included student characteristics such as free/reduced lunch students, and high school characteristics such as degree of urbanization.

In June of 2003, as a result of the extensive analyses and research, the Colorado Commission on Higher Education (CDHE) passed the revised Admission Standards Policy which successfully realigned the index to account for the grade inflation, and another component, the Higher Education Admission Requirements (HEAR) were adopted. The HEAR added high school course completion to the policy and currently requires that students have completed the following course Carnegie units:

- 4 years of English, of which 2 years must be Grammar and Composition

- 4 years of mathematics at the Algebra I level and above

- 3 years of natural science of which 2 must contain a laboratory component

- 3 years of social studies of which 1 must be US or World History

- 2 years of the same foreign language

- 2 years of academic electives

The composition of the HEAR was based on ACT recommendations for college readiness, adding a few more rigorous components such as an addition year of math and 2 years of foreign language. The policy was later modified to reduce the 2 years of foreign language to 1 year. The recalibrated index was implemented beginning with the entering class of 2004, and the HEAR was initially introduced with the graduating class of 2008, with comprehensive implementation with the class of 2010.

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Literature Review

The predictive validity of several high school performance indicators has long been analyzed, with Geiser and Studley (2002) referring to the debate over aptitude and achievement. In analyzing the history of the Colorado Department of Higher Education's (CDHE) admission policy, note that research was conducted at CDHE in response to rising remedial rates in the state. Specifically, between academic years 2002 and 2005, the state realized a continuous increase in the number of recent high-school graduates who were identified as needing remedial education once admitted to college (Futhey & Brandon, 2003; Gianneschi, 2006).

In a Report to the Legislature in 2004, Futhey & Brandon noted that approximately two-thirds of the students attending state institutions were found to be lacking many of the traditional courses deemed necessary to succeed in college. For example, in some cases, students were found to have taken as little as one year of high-school mathematics. As a result, many of the competencies considered necessary for success in college appeared to be absent. In October of 2003, the CDHE initiated the implementation of the HEAR, a mandatory high-school core curriculum requirement to be phased in with the graduating class of 2008, which included (a) three years of mathematics, (b) three years of social science, (c) three years of natural science, and (d) four years of English. For 2010, CDHE mandated an additional phase that included an additional year in mathematics and one year of foreign language. The HEAR, along with other components of high-school performance, was mandated to be used in determining student eligibility at Colorado 4-year public institutions of higher education. Completion of the core was restricted only to those students applying for admittance into one of Colorado's public baccalaureate institutions. Community college entrance requirements were not affected (Carnahan, Leal, & McKeever, 2007). Although the course data are not available in the current

analyses, note that ACT sub-scores and developmental assignments will be used in these specific areas as potential proxies for this information.

Methodology

The research was conducted in two phases. In phase one, the alignment of the index was examined using an equipercentile methodology, as described by Kolen and Brennan (1995). Once adjusting for differences, the measures were each standardized using the same algorithm $((x - \mu) / \sigma + 50)$ utilized in both 1986 and 2003. Each indicator was then assigned the realigned score as such described. Impact on applications and enrollments was also examined to determine individual institutional losses and gains in terms of applicant pool and enrollment impact. An additional purpose of examining the alignment between the admission index and the remedial placement as dictated in the remedial policy was also stated.

Two additional models were also examined for the purpose of examining differential impact as well as examining alignment with the state's current remedial policy. The second model examined only the high school performance component and a standardized test component, but for ACT, a pseudo-composite was created utilizing only the ACT Math score and the ACT English score, bringing it more in alignment with the SAT Verbal and Math scores used to determine remedial needs in Math and English. The final model utilized both the original components, the high school component and the standardized component, but examined impact of weighting the high school component as two-thirds of the index and the standardized test component as one-third.

In phase two of the analysis, an inductive modeling approach was used to determine what factors were predictive of student success in terms of first-semester college GPA and fall to spring retention. These outcomes were selected specifically because they are the first outcomes

available, thus reducing the threat to validity that time inserts. SPSS Modeler was used, and a CHAID model was constructed to examine academic preparation and other demographic indicators. As the methodology was inductive, great care was taken in the interpretation of the results in order to avoid any spurious relationships in interpretation.

Analysis

The main purpose of phase one of the study was to examine the alignment of the current admission index and determine whether or not the components remained aligned. The data showed that indeed, there has been grade inflation for the population of first-time entering students, and subsequently, the students with higher high school GPAs acquired higher index scores than they would have received immediately after the re-calibration in 2003.

That said, it is also important to examine the impact of implementing the re-calibration. In examining the applicant pools and subsequent enrollments of the 4 year institutions, it was found that renormalizing the distribution affected those institutions whose current index cut scores are at the tails of the distribution.   Those institutions most positively affected included Metropolitan State University of Denver, Adams State University and Western State University of Colorado. Negative impacts were seen by Colorado School of Mines, University of Colorado at Boulder, and Colorado State University at Fort Collins, with the largest impact on applicant pools at Colorado School of Mines.

Finally, in examining at what point a student could be quite sure of not being placed into any developmental courses, it is not until the student achieves an index score of 125 that developmental needs become a rarity.   These two policies do appear to be somewhat out of

sync, but this could be due to the fact that developmental cut scores are solely based on test scores with no high school component being examined.

In phase two of the research, two different models for calculating the index were examined to see if this could alleviate some of the disconnect between the admission index and the remedial cut scores. In the second model, the high school performance component remained unchanged, but the test score component was altered to use a "pseudo" ACT composite rather than the true ACT composite in which the new score would be based solely on ACT Math and ACT English scores. This would better align with the SAT Verbal and SAT Math. The impact of this model on redistributing scores was more severe than a simple re-calibration, however it did reduce the disparity slightly between the admission index and developmental cut scores.

For the third model, both the original standardized test component and high school performance components remained unchanged, however, the weighting of each piece was changed so that the high school performance component comprised 2/3 of the index whereas the standardized test component was only weighted to add 1/3 of the index score. The impact of this model on redistributing scores was the most severe with a maximum swing in individual scores of up to 18 points. Use of this method would have marked effects on applicant pool distributions.

In Phase II of the analyses, utilizing CHAID predictive modeling techniques, it was quite clear what factors were predicting student success as measured by first-term college GPA. As only those students who were subject to the index were included, the dataset was quite complete and robust. The data were then randomly split into two samples – one to build the model and the other to test it. Upon completion of this analysis, the data were broken into several high school

GPA ranges, with those data being the most highly predictive of success (Table 1). Indicators

that flushed out in the various GPA ranges are also included in this table.

Table 1. Results of CHAID Analysis Predicting First Semester GPA of Students

	High School GPA Range	Other indicators	Predicted First Term GPA	Effect Size
Range 1	Less than 2.69		1.934	-0.756
Range 2	2.69-2.95		2.204	-0.486
		Developmental Writing Placement	1.775	-0.429
Range 3	2.96-3.12		2.348	-0.343
		ACT English <= 17	2.143	-0.245
		ACT English > 25	2.589	0.201
Range 4	3.12-3.28		2.499	-0.192
		Developmental Math Placement	2.241	-0.258
Range 5	3.29-3.42		2.625	NS
		ACT Reading > 29	2.836	0.211
Range 6	3.43-3.57		2.772	NS
		Developmental Math Placement	2.536	-0.236
Range 7	3.58-3.71		2.908	0.217
		ACT English <= 19	2.604	-0.304
Range 8	3.72-3.87		3.059	0.368
		ACT English <= 20	2.803	-0.256
Range 9	3.88-3.99		3.230	0.539
Range 10	4.00		3.457	0.767
		ACT Composite <= 25	3.244	-0.213

Discussion

The results suggest a few things. First of all, high school grade averages are the most

important factor in trying to predict first semester college GPA. Although a few ranges with this

measure were not found to be significant, examining the tails of the distribution is quite stark,

with effect sizes in excess of .7, which is considered to be a moderate to large effect size. That said, the remainder of the variables should be approached cautiously as effect sizes below .3, in particular, can be statistically significant in large samples, but the effect sizes are low (Wilson Van Voorhis & Morgan, 2007). That said, note that larger samples also tend to more accurately depict the actualities of the behaviors examined here (Cohen, 1992; Marcoulides, 1993; Wilson Van Voorhis & Morgan, 2007). Thus, it must be considered that within each of these ranges where the CHAID analysis broke them out, that there is some predictive power in the student ACT scores seen above. This would suggest that an appropriately constructed index, potentially in coordination with developmental needs, might be able to differentiate students in accordance with the institutional roles and missions set forth in C.R.S 23 Articles 40-56.

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