White Paper

University of NORTH ALABAMA 1830

ACT Prediction Service Report

Office of Institutional Research, Planning, and Assessment

BUILDING the PRIDE

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EXECUTIVE SUMMARY

The University of North Alabama recently participated in the ACT Prediction Service Report. This service provides participating universities with descriptive and predictive data about their freshman populations. An analysis of information found in these reports produced the following findings, based on UNA's fall 2011 first-time freshmen :

- A moderate relationship exists between ACT scores and overall first-year college GPA.
- High school GPA was a better predictor of overall first-year GPA, as compared to ACT scores.
- Freshmen retained for one year had an average ACT Composite score higher than those not retained.
- Freshmen were retained at higher rates when UNA was closer to their primary choice of college.
- Off-campus freshmen were retained at a higher rate than freshmen residing on-campus.
- Freshmen residing off-campus indicated that UNA was their primary choice at a rate (40.4%) higher than freshmen residing on-campus (29.3%).
- ACT scores and high school GPAs were better predictors of first-year college GPA for athletes than for non-athletes.
- Female student athletes were retained at a rate exceedingly higher than male athletes and significantly higher than non-athlete females and non-athlete males.

INTRODUCTION

The use of standardized tests, such as the ACT and SAT, has become the principle method when evaluating high school students' readiness for college. ACT® college readiness assessment is a curriculum-and standards-based educational and career planning tool that assesses students' academic readiness for college. The assessment tool consists of four multiple-choice tests: English, Mathematics, Reading, and Science with an optional Writing component ("The ACT® Overview", 2013). The majority of universities and colleges across the nation require their prospective students to complete the ACT and submit their scores to the admissions office as one of the requirements for consideration for admission. Many schools have minimum ACT requirements along with minimum high school grade point averages (HSGPA) that must be met for acceptance. Due to the high number of students completing this assessment tool, ACT provides a variety of complimentary reports to higher education institutions, one of which is the ACT's Prediction Service Report. This report produces descriptive data and predictive equations using past new freshmen's ACT scores, HSGPAs, and first year college GPAs to predict how future students will perform in certain college courses and overall their first year. This tool allows colleges and universities to gain further insight concerning their freshman populations.

The University of North Alabama (UNA), with assistance from the Office of Institutional Research, Planning, and Assessment (OIRPA), participated in the 2013 ACT Prediction Service Report. Although UNA receives the invitation to participate annually, this was the University's first time submitting. The data submitted to ACT for the 2013 prediction report consisted of 929 first-time freshmen who attended UNA

"This report produces descriptive data and predictive equations using past new freshmen's ACT scores, HSGPAs, and first year college GPAs to predict how future students will perform in certain college courses and overall their first year."

in the fall of 2011. The student information was used to generate the descriptive and predictive reports. The overall summary report is produced and provided by ACT and details demographic information concerning the submitted freshman population, as well as descriptive analyses. UNA chose to identify six subgroupings which are as follows: Gender (Male or Female), Collegiate Athlete (Yes or No), and Dormitory Resident (Yes or No). ACT allows participating institutions up to nine subgroupings. Reports for each of the six subgroups were provided by ACT, along with the overall summary report.

The data file, created by OIRPA and submitted to ACT in May of 2013, contained a record for each new student in the fall 2011 freshman class. The data were categorized into either data used for matching or data used for predicting. Data used for matching consisted of demographic and personal identifying information, such as name, gender, date of birth and the last four digits of their Social Security Number. These matching data were submitted so that ACT could identify UNA's students within their database. ACT gathers these data during their testing process. Furthermore, during administration of the ACT exam, students were asked to self-report their grades in selected high school courses and to select from a pre-designed list the high school courses they had completed or planned to complete. These self-reported grades, as well as their ACT scores, were used in the ACT Prediction Report as predictor variables. The prediction data submitted to ACT was captured at the end of the spring 2012 semester and included student grades in selected courses at UNA (Biology 101, English 111, History 101, and Mathematics 100), cumulative GPA of new freshmen completing their first year, official HSGPA, sub-group distinctions (Gender, Athletics, Housing), and an indicator of each student's retention the following fall 2012 semester.

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As mentioned previously, seven reports were provided by ACT, an overall summary report of all freshmen and a report for each of the six subgroups. Within each report are three primary sections. The first section contains a series of "Highlight Tables", which present the major descriptive findings of the report in terms of counts, means, percentiles, and standard deviations of ACT score, HSGPA, and college GPA for the overall population and various sub-populations, and includes gender, race, and other demographic breakdowns. This section also presents predictive data using correlations derived primarily from multiple regression analyses. Correlations provide an index that describes the direction and strength of the relationship between two or more variables. Correlation values will always reside within the range of -1.00 to +1.00. As the correlation value approaches either -1.00 or +1.00, the strength of the relationship grows. The positive or negative value simply indicates the direction of the relationship, with a negative value indicating that as one variable's value increases the other variable's value decreases. A correlation value of zero indicates no relationship. The "Pearson r" is the correlation statistic used in the ACT Prediction report and is referred to as "R". The upper-case "R" is used here to indicate that multiple predictor variables (i.e. a student's four ACT subject scores) are used together when correlating to one other variable (i.e. UNA cumulative GPA). Please reference **Table 1** for guidelines when interpreting 'r' correlation coefficient values.

Table 1 **Interpreting Pearson's r Strength**

Pearson's r Correlation	Strength of the Relationship
Less than 0.3	Little if any relationship
0.3 - 0.49	Small relationship
0.5 - 0.69	Moderate relationship
0.7 or greater	Strong relationship

ACT has created three correlation indices: the T-index, H-index and the combined TH-Index.

- T-index assesses the strength of the relationship between the four ACT subject tests (Math, English, Reading, and Science) and the grades students received in certain UNA courses as well as their cumulative UNA GPA after the first year.
- H-index evaluates the strength of the relationship between the student's self-reported high school grades earned in English, Mathematics, Social Studies, and Science and the grades students received in certain UNA courses as well as their cumulative UNA GPA after the first year.
- TH-index is a combination of the T and H index. This index takes the four ACT subject tests along with the four self-reported high school grades and determines how well these correlate with the grades students receive in certain UNA courses as well as their cumulative UNA GPA after the first year.

In referencing the table below it is evident that the TH index (the combination of the four ACT subject tests and self-reported HSGPA for the four courses) is the best predictor for the four college courses listed below; Biology 101, English 111, History 101, Mathematics, 100, as well as the overall first year GPA. However, it is worth noting that self-reported HS course GPA's are a better predictor than the ACT subject scores in three of the four college courses and overall GPA.

"...it is evident that the TH index (the combination of the four ACT subject tests and self-reported HSGPA for the four courses) is the best predictor for the four college courses listed..."

TABLE H-1 RELATIVE EFFICIENCY OF DIFFERENT ACT INDICES IN PREDICTING COLLEGE GRADES

COLLEGE GPA	AREA	NCNT	T INDEX R	T INDEX SE-EST	H INDEX R	H INDEX SE-EST	TH INDEX R	TH INDEX SE-EST
BIOLOGY 101	N	274	0.536	1.009	0.543	1.004	0.602	0.946
ENGLISH 111	E	469	0.398	0.689	0.433	0.677	0.485	0.653
HISTORY 101	S	259	0.542	1.002	0.445	1.067	0.572	0.969
MATHEMATICS 100	M	256	0.436	1.280	0.498	1.234	0.561	1.167
OVERALL	O	796*	0.525	0.909	0.564	0.882	0.617	0.838

**One student's UNA GPA was not incorporated in analysis*

A final set of correlations are provided in this section as well. Students' overall high-school GPA, as reported to UNA, were submitted to ACT. These official high school GPAs were correlated to students' grades in select UNA courses and to their cumulative UNA GPAs. Since these high school GPAs are official and not self-reported, confidence in their accuracy, and therefore the accuracy of the correlations, are greater.

The second section of each ACT Prediction Report is referred to as the "Local Interpretation (LI) Tables". This section provides several tables that allow for the interpretation of an individual student's ACT scores and/or high school grades in terms of percentile rank. Tables within this section also allow for predictions of collegiate GPA in selected courses and overall, based on the student's individual ACT scores and high school grades in select courses. This section may prove to be useful to students and student advisors.

The third section of each ACT Prediction Report is referred to as the "Technical Tables" section. This section provides means and standard deviations of ACT scores and high school grades for students within select university courses, as well as overall freshman means. In addition, this section provides a series of tables that examine correlations between ACT scores and high school grades, ACT scores and university GPAs (overall and select courses), and high school grades and university GPAs (overall and select courses). Information within these latter tables allow for universities to access and compare the validity and strength of either ACT scores or high school grades in predicting academic success of their freshman population.

Analyses of data found within these reports were performed by the OIRPA staff in order to better understand the predicting variables' such as ACT scores, high school GPAs, and population subgroups, as it relates to student performance. Due to the abundance of data found within these reports, select highlights are reported in the sections following.

OVERALL SUMMARY

Of the 929 fall 2011 first-time freshmen submitted, ACT only identified 797 students from their database. Therefore, the data presented below are a reflection of only these 797 students.

- A moderate relationship (**R = 0.525**) exists between ACT scores and overall first-year college GPA (*T Index*).
    - ACT scores predicted first-year college GPA in select courses with low to moderate strength: Biology 101 (R = 0.536); English 111 (R = 0.398); History 101 (R = 0.542); Mathematics 100 (R = 0.436).
    - ACT scores for UNA freshmen predicted college GPA at a level noticeably higher than the national average.
- Students' self-reported High School grades in specific subjects (H index) proved to be somewhat better than ACT scores (*T Index*) when predicting first-year college GPA (**R = 0.564**).
    - Correlations between self-reported high school grades and individual courses are as follows: Biology 101 (R = 0.543); English 111 (R = 0.433); History 101 (R = 0.445); Mathematics 100 (R = 0.498). These correlations, with the exception of History 101, had a stronger relationship with self-reported HSGPA's than ACT scores, as well.
- Combining students' self-reported high school grades and students' ACT scores (*TH* Index) yielded a greater predictive value with first-year college GPA than either one did alone (**R = 0.617**).
    - Correlations for individual courses are as follows: Biology 101 (R = 0.602); English 111 (R = 0.485); History 101 (R = 0.572); Mathematics 100 (R = 0.561).

- Official high school GPA was the best predictor of first-year college GPA (**r = 0.636**).
    - Correlations for individual courses are as follows: Biology 101 (r = 0.597); English 111 (r = 0.475); History 101 (r = 0.453); Mathematics 100 (r = 0.537).
- Students who were retained to the following fall 2012 semester (n=564) had an average ACT Composite score (22.1) higher than those of students not retained (n=233; ACT C = 20.2). **Table 2** (Appendix) displays scores by gender, ethnicity, and retention.
- Students were retained at higher rates when UNA was closer to their primary choice.
    - Rates of retaining students based on choice are as follows: First choice = 76.0%; Second choice = 70.0%; Third-Sixth choice = 69.5%; Greater than sixth choice = 66.9%.
    - UNA was the first choice institution for 35.0% of students, second choice for 12.5%, between third and sixth for 11.9%, and greater than sixth for 40.5% of students.

SUBGROUP ANALYSIS: RESIDENCE (ON-CAMPUS VS. OFF-CAMPUS)

The ACT Prediction Report segmented the 2011 Freshman Cohort (n=797) into students residing within University Housing (n=389) and those residing off-campus (n=408). Multiple comparison analyses were performed between the two groups. Highlights of the results for these analyses are presented below.

- Off-campus students were retained at a higher rate than students residing on-campus.
    - Of the selected 797 Freshman Cohort students included in the analyses, students residing in University Housing were retained the following fall semester at a 67.4% rate, versus a 74.0% rate for off-campus students.
    - Female students were retained at a higher rate than males for both off-campus (77.6% vs. 68.5%) and on-campus (72.8% vs. 67.4%) students.
    - All ethnicity groups were retained at a higher rate for students living off-campus, except for African-American students. African-American students living on-campus were retained at a 69.3% rate, versus 60.0% for off-campus African-American students.
- Student ACT scores (*T Index*) predicted overall first-year college GPA for students residing in University Housing (**R = 0.536**) and students residing off-campus (**R = 0.496**) at moderate strengths.
    - The average ACT Composite score for students residing off-campus (22.0) was higher than that of students residing on-campus (21.1).

  - Student first year UNA GPA was higher for students residing off-campus (2.64) than for students residing on-campus (2.35).

- Official high school GPA was the best predictor of overall University GPA for both on-campus (**r = 0.644**) and off-campus (**r = 0.608**) students.

Of the students residing off-campus, 55.2% indicated that UNA was their first (40.4%) or second (14.7%) choice. Of the on-campus students, 39.6% indicated UNA as their first (29.3%) or second (10.3%) choice.

SUBGROUP ANALYSES: ATHLETICS

The ACT Prediction Report segmented the 2011 Freshman Cohort (n=797) by students participating in athletics (n=55) and students not participating in athletics (n=742). Multiple comparison analyses were performed between the two groups. Highlights of the results for these analyses are presented below.

- The average ACT Composite score (20.9) and first year cumulative UNA GPA (2.37) for student athletes were both slightly lower than that of non-athletes (ACT = 21.6; GPA = 2.51).
- Student athletes were retained to the following fall semester at a rate (67.3%) slightly less than non-athletes (71.0%).
- Student athletes' ACT scores (T Index), self-reported high school grades (H Index), ACT scores and self-reported high school grades in combination (TH Index), and official high school GPAs all correlated to first year UNA GPA greater than non-athletes' scores and grades.
    - Athletes: T Index: R=0.600; H Index: R=0.720; TH Index: R=0.744; HS GPA: r=0.672
    - Non-Athletes: T Index: R=0.520; H Index: R=0.559; TH Index: R=0.613; HS GPA: r=0.633
- UNA was the 1st (25.4%) or 2nd (7.3%) choice for only 32.7% of athletes and 48.7% of non-athletes.
    - Student athletes that indicated UNA as their first or second choice were retained at a rate of 77.8%. Athletes that indicated UNA as their third or higher choice were retained at a rate of 62.2%.
    - Non-athletes who indicated UNA as their first or second choice were retained at a rate of 74.2% vs. a rate of 68.0% for non-athletes who indicated UNA as their third or higher choice.

- Female student athletes were retained at a rate (89.5%) exceedingly higher than male athletes (55.6%) and significantly higher than non-athlete females (74.6%) and non-athlete males (64.7%).

DISCUSSION

Predicting students' academic performance in college is a difficult task. Student performance in high school and on standardized tests, such as the ACT and SAT, serve as the primary criteria for most colleges' and universities' admissions decisions. In addition, students with higher ACT scores are typically automatically awarded scholarships at many universities. With such high priority given to students' ACT scores, universities should be confident that ACT scores are the best predictor of overall student success, in terms of retention, graduation and grade-point average. This report has shown ACT scores to be moderately correlated with college GPA. However, ACT scores may not be the greatest predictor of student success. Students' high school GPAs were noticeably better at predicting first-year college GPA than were students' ACT scores. In light of this finding, institutions of higher education may find it to be a better practice to give greater consideration of students' high school success when developing admissions and scholarship policies. Furthermore, recent research by Crede and Kuncel (2008) has found non-cognitive factors such as study habits, study attitudes, and study motivation to be comparable to ACT scores in predicting student success in college. Interestingly, of these non-cognitive factors, only study skills are related (weakly) to measures of general cognitive ability (ACT/SAT) and to prior performance in high school. Though it is difficult to assess these non-cognitive factors, an admissions model that incorporated these factors would most likely serve the institution significantly better.

Analysis of subgroups provided several notable results. Firstly, the retention of students residing off-campus was shown to be higher than that of students residing on-campus. Secondly, students residing off-campus (40.4%) indicated at higher rates than those of on-campus students (29.3%) that UNA was their primary choice of universities to attend. For the overall freshman population, retention rates rose as students more closely indicated UNA to be their primary choice of university to attend. Further research will be required to gain an understanding as to why on-campus students are retained at lower rates. However, based on these findings, the level of initial desire to attend UNA may be a factor that distinguishes these two groups and contributes to differences in retention.

Appendix

Table 2

Overall 2011 Cohort Average UNA GPA, Average ACT Composite by Gender, Ethnicity, College Choice, and Retention Population*

	Retained			Non-Retained			Total		
	N	Avg UNA GPA	Avg ACT Composite	N	Avg UNA GPA	Avg ACT Composite	N	Avg UNA GPA	Avg ACT Composite
Total Students	564	2.59	22.10	233	1.61	20.19	797	2.50	21.54
Gender									
Men	194	2.25	22.10	111	1.40	20.46	305	2.18	21.51
Women	370	2.78	22.09	122	1.79	19.94	492	2.69	21.55
Ethnicity									
Black	94	1.87	18.45	45	1.13	17.60	139	1.90	18.18
Native American	5	2.43	21.44	2	2.30	19.50	7	2.33	20.89
White	436	2.74	23.00	174	1.73	20.83	610	2.65	22.38
Hispanic	12	2.70	21.23	3	1.07	20.67	15	2.45	21.12
Asian	1	2.20	20.00	0	N/A	N/A	1	2.20	20.00
Multiple	9	2.46	20.78	3	1.47	21.00	12	2.41	20.83
Unknown	7	2.01	22.60	6	1.55	21.83	13	2.01	22.25
College Choice									
First Choice	212	2.65	22.20	67	1.45	20.40	279	2.55	21.77
Second Choice	70	2.72	23.47	30	1.82	21.45	100	2.61	22.87
Choices 3-6	66	2.65	22.91	29	1.61	20.66	95	2.59	22.22
Other	216	2.47	21.31	107	1.65	19.60	323	2.39	20.75

** Includes only 797 of the 929 fall 2011 freshman cohort.*

References

Crede, M., & Kuncel, N. R.(2008). Study habits, skills, and attitudes: the third pillar supporting collegiate academic performance. Perspectives on Psychological Science, 3, 425-453.

The ACT® Overview. (2013) Retrieved September 10th, 2013, from http://act.org/products/k-12-act-test/

Your College Freshmen: An Interpretive Guide for the ACT Prediction Research Service. (2006). Iowa City, Iowa: *ACT*. Retrieved from http://www.act.org/research/services/pdf/YourColleg-eFreshmen.pdf